

On Gall-Stones and their Treatment

A.W. Mayo Robson, FRCS.

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CLINICAL MANUALS
FOR
PRACTITIONERS AND STUDENTS
OF MEDICINE.

ON GALL-STONES

AND

THEIR TREATMENT.

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SURGERY IN THE LEEDS SCHOOL OF MEDICINE;
ETC.

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P R E F A C E.

THE increasing supply of medical works placed in the hands of the profession each year, makes it ineuminent on him who ventures to add to their number that he shall find a good excuse for the use of his pen. My apologies, if such be required, for writing this little work, must rest—

First, on the importance of the subject: for it is to be borne in mind that post-mortem evidence proves gall-stones to be present in ten per eent. of all bodies examined, and although symptoms are not found in all cases, the suffering and danger endured by many of its victims, constitute eholelithiasis a subjeet of the first import-
anee;

Secondly, on the neeessity of a better acquaintance with the symptoms, so that a diagnosis may be made in an earlier stage than is usually done, and that the commonly accepted idea of the presence of jaundiee being essential to the diagnosis of gall-stones, may disappear;

Thirdly, that I believe no reeent work dealing specially with the subjeet, or eonsidering it from its surgical aspeet, has been published in our language;

And lastly, on the faet that, thanks to my medical friends and eolleagues, and to my

position on the Honorary Staff of the General Infirmary at Leeds, I have had the opportunity of seeing a considerable number of cases of cholelithiasis, and of operating on those that required surgical interference, which experience I have embodied in this work.

It may perhaps be thought that I have reported the cases in the final chapters with too much detail. For this I offer my readers no apology, as I feel sure that it is only by giving accurate details of individual cases, that the experience gained by one can be handed on to others who have not had the same opportunities, but who may, nevertheless, be called upon to advise on the subject.

My thanks are due to the President and Council of the Royal Society for kindly permitting me to reproduce a paper of mine published in their "Proceedings;" to Mr. Jonathan Hutchinson, F.R.S., for allowing me to make use of plates, and to refer to cases published in his "Archives of Surgery;" to Mr. Lawson Tait, for the use of an illustration published in the *Edinburgh Medical Journal*; and to Dr. MacGregor Young, M.A., for his valuable assistance, not only in the execution of some of the figures, but in the revision of proofs.

*Hillary Place, Leeds,
March 10, 1892.*

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ON GALL-STONES.

CHAPTER I.

ANATOMICAL CONSIDERATIONS.

THE gall-bladder lies in a slight depression on the under surface of the anterior part of the right lobe of the liver, immediately to the right of the lobus quadratus, and extends backwards and inwards, with its duct, as far as the transverse fissure of the liver.

The notch on the anterior border of the liver, indicating the fissure of the gall-bladder, can usually be felt when the patient is lying on his back with the knees drawn up, by placing the flat hand below the right costal margin, pressing gently, and telling the patient to draw a long breath, when the border of the liver can be felt moving under the hand, and if the gall-bladder be distended, its fundus may be felt as a smooth rounded projection immediately below the notch. If the liver be of normal size, the gall-bladder will be situated just under the tips

of the ninth or tenth costal cartilage, but when there is hepatic enlargement the gall-bladder will be pushed downwards.

In normal circumstances it cannot be felt on palpation; and in many cases of chole-lithiasis, the gall-bladder, being contracted, cannot be discovered by the hand. In fact, it is only when abnormally distended that palpation can ascertain its presence.

Normally, the gall-bladder can be reached by a vertical incision along the upper end of the right linea semilunaris.

Its length varies, according to its state of distension, from $2\frac{1}{2}$ to 4 inches, and its normal capacity seldom exceeds one ounce, but in certain pathological states this is liable to very great variation, as will be noticed by a reference to some of the cases mentioned later.

Dr. MacAlister gives the average capacity as 5·43 drams, but in the gall-bladders I have examined the average capacity has been nearly an ounce (7·5 drams). I have frequently found it shrunken to the size of a bean, or but little larger, and at other times so distended as to have a capacity of 30 to 40 ounces: but cases have been reported where the gall-bladder was so large as to have been mistaken for an ovarian tumour,

and operated on as such, even by experienced surgeons.

When the liver is enlarged, the gall-bladder is pushed downwards, and in several cases I have had to make my incision for reaching it, opposite the umbilicus, or even midway between that point and Poupart's ligament. On the other hand, when the liver is contracted the gall-bladder may be placed far up under cover of the ribs. On one occasion, in operating for gall-stones, the liver being contracted, I found the gall-bladder shrunken around a single calculus, and situated so far under cover of the ribs that it could not be reached without enlarging the incision sufficiently to admit the hand.

On several occasions I have found the ordinary position of the gall-bladder vacant, and the shrunken viscera situated near the transverse fissure of the liver under cover of the pylorus, with the transverse colon adherent over it. But the most unusual form of displacement I have seen was in a case where the liver was almost completely bifid, the left lobe predominating and pushing the right lobe, and with it the gall-bladder, so far round to the right as to make it project into the lumbar region.

In the human subject the gall-bladder is

very rarely absent, although it is not uncommon to find it atrophied and shrunken so as to be scarcely recognisable.

When the gall-bladder is distended it enlarges in a direction downwards and forwards, in a line which, drawn from the tenth costal cartilage, crosses the middle line between the umbilicus and pubes.

It is usually fixed to the under surface of the liver by connective tissue and small blood-vessels, the peritoneum being reflected over its sides and under surface, the fundus being free and completely covered with peritoneum. At times the peritoneum so surrounds the body of the organ as to meet on its upper surface and form a fold connecting it with the liver like a mesentery. Mr. Greig Smith, on one occasion in the eadaver, found a double fold of peritoneum passing between the free surface of the gall-bladder and the interior of the foramen of Winslow.

The under surface of the gall-bladder facing backwards and downwards is in relation with the hepatic flexure of the colon and with the first part of the duodenum. Not infrequently the right border of the omentum is in contact with the fundus. At times the pyloric extremity of

the stomach, the small intestine, and the right kidney are in contact with the gall-bladder; the last, however, rarely.

When there have been repeated attacks of cholelithiasis, adhesions are nearly always formed, peritonitis being a frequent concomitant of the disease. It is not unusual to find adhesions of the omentum, colon, duodenum, and pylorus to the under surface of the liver and to the gall-bladder; the latter organ then being not infrequently shrunken and under cover of the overlapping adherent viscera.

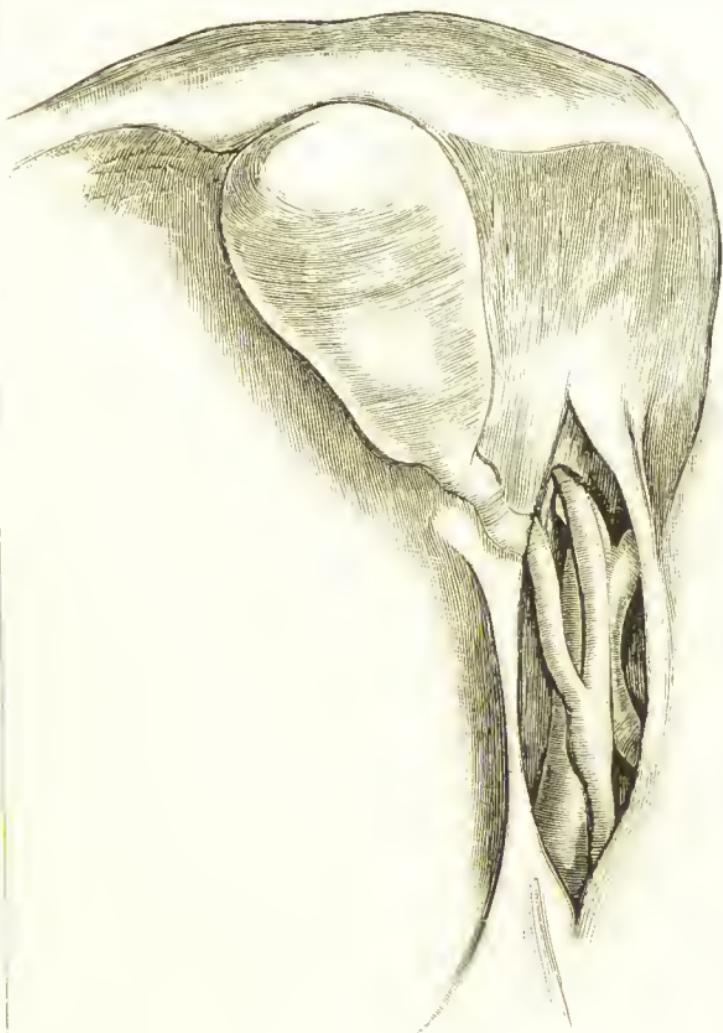
Including the peritoneal investment, which, as previously mentioned, is only partial, the gall-bladder has three coats. The middle one is composed of fibrous tissue, with a thin layer of unstriped muscular fibre arranged principally in a longitudinal direction. This tunic is tough and strong, and not easily dilatable. It has firm adhesions to the serous coat, but is fixed by loose tissue to the mucous membrane, or inner coat, which is raised in ridges and has polygonal depressions on it, the rugæ being obliterated when the viscus is much distended.

The mucous membrane, covered with columnar epithelium, is well supplied with glands, the function of which, in the secretion of mucus,

does not cease when the gall-bladder has from stricture or blockage of its duct ceased to act as a biliary reservoir. Thus, in mechanical obstruction of the cystic duct, although the gall-bladder may be empty at the time of blockage, the secretion and accumulation of mucus cause its distension, and, on tapping, a clear fluid is evacuated. In several cases of intense jaundice, where the gall-bladder has been enormously distended, I have found this fluid to be entirely free from all trace of biliary salts and quite colourless.

The cystic duct leads from the gall-bladder to the common bile duct, and after a course of an inch to an inch and a half it joins the hepatic duct. The course of the cystic duct is at first backwards and to the left, and after joining the hepatic duct at an acute angle, the canal, under the name of the common duct, runs downwards in the right border of the lesser omentum, to terminate by joining the pancreatic duct, and passing through the inner wall of the descending portion of the duodenum.

The hepatic duct, about two lines wide and two inches long, is formed by the union at an obtuse angle of the two branches from the right and left lobes of the liver. It descends to the



J. W. Hogg's

Fig. 1. — Call-Bladder and Bile Ducts.

lesser omentum in front of the portal vein and to the right of the hepatic artery (Fig. 1), to join the cystic duct at an acute angle.

The ducts have an outer serous, a middle fibromuscular, and an internal mucous coat, the last being thrown into folds in the cystic duct, one of which, larger than the rest, overhangs the entrance to the gall-bladder and acts as a sort of valve. These folds are usually described as being arranged in the form of a spiral, but this is not always well marked, and when distended the mucous lining of the ducts is free from ridges.

The common bile duct, about three inches in length, has most important relations as it passes downwards and backwards to its termination, since it lies in front of the portal vein and to the right of the hepatic artery. Passing behind the first part of the duodenum, it continues downwards between the second part of the duodenum and the head of the pancreas, and before entering the intestine the duct runs obliquely for about three-quarters of an inch between its coats, forming an elevation beneath the mucous membrane, and becoming somewhat constricted before opening into the bowel, about four inches beyond the pylorus.

The diameter of the cystic duct varies, it being widest at the commencement, and narrowest towards its termination. The common duct, about two lines in width, expands to three lines in diameter at the ampulla of Vater, and at the dilatation just beyond the junction of the hepatic and cystic ducts: the narrowest part is at its outlet into the duodenum, where it only admits a small probe.

In ordinary circumstances the common bile duct readily admits a No. 7 catheter, the cystic duct admitting a No. 5 catheter; but under pathological conditions both are liable to great variation: for instance, in one case I found the cystic duct so dilated as to be capable of holding an ounce of fluid, its communication with a distended gall-bladder being constricted; but after the constriction was overcome the index finger could be easily passed along it.

On several occasions I have removed from the cystic duct gall-stones half an inch in diameter. The common duct in like manner admits of considerable distension. There is a natural dilatation of the common duct, not generally described (Fig. 1), just beyond the junction of the cystic and hepatic ducts, and here it will

be found that gall-stones frequently become impacted.

When the duct is distended the walls become much thinned, so that it is perfectly easy to feel the shape and size of the concretions that it contains.

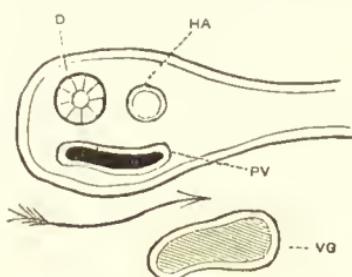


Fig. 2.—Section of the Free Border of the Lesser Omentum, showing the relations of the Common Bile Duct.

HA, Hepatic artery; D, bile duct; PV, portal vein; VC, vena cava; the arrow indicates the foramen of Winslow.

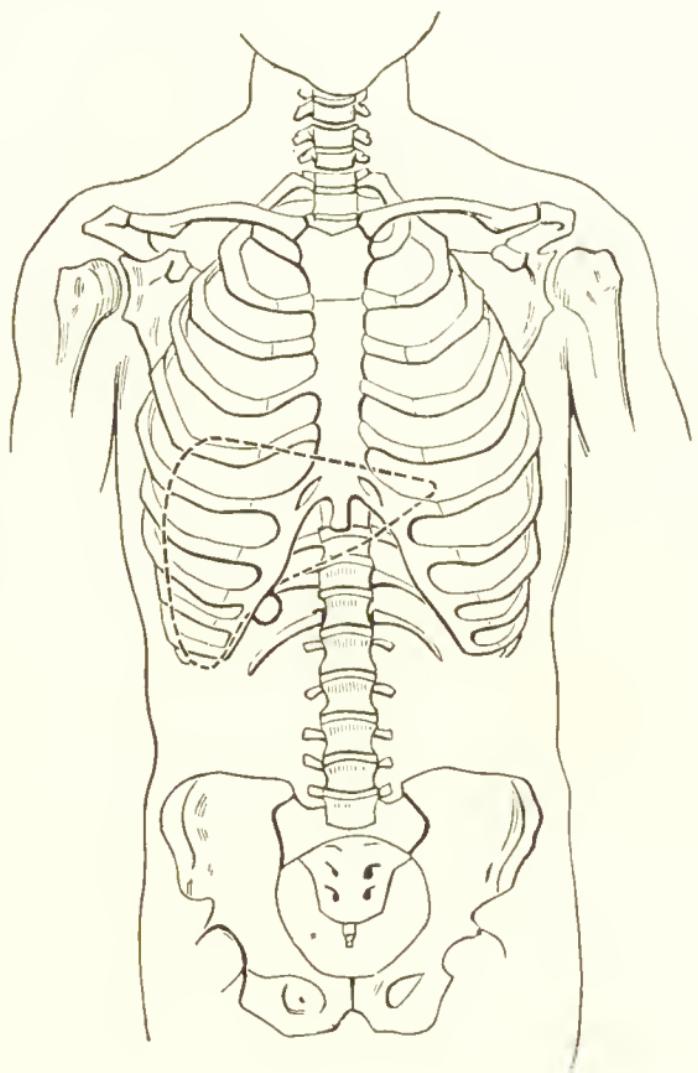
The gall-bladder is freely supplied with blood by the cystic artery, a branch of the right division of the hepatic.

The cystic artery sends a branch along

the wall of the cystic duct as far as the common duct, where it meets a branch given off from the gastro-duodenal artery, with which it anastomoses.

At times, instead of one artery, the cystic gives off two branches, which course along each side of the duct.

In the free border of the lesser omentum the bile duct and hepatic artery lie in front of the portal vein, but as the artery approaches the liver it diverges to the left, and leaves a space between itself and the duct. (For relations, see Figs. 1, 2.)



J. W. H.

Fig. 3.—Diagram showing relation of Gall-bladder to surface.

The nerve supply of the gall-bladder and ducts is from the sympathetic branches of the cœliae plexus accompanying the cystic arteries.

The cystic veins empty themselves into the portal vein.

The following varieties are mentioned in Quain's "Anatomy," p. 626.

The gall-bladder is occasionally wanting, in which case the hepatic duct is much dilated within the liver or in some part of its course.

Sometimes the gall-bladder is irregular in form, or is constricted across its middle, or, but more rarely, it is partially divided in a longitudinal direction.

Direct communications by means of small ducts, named "hepato-cystic," passing from the liver to the gall-bladder, exist regularly in various animals: and they are sometimes found as an unusual formation in the human subject. The right and left divisions of the hepatic duct sometimes continue separate for some distance within the gastro-hepatie omentum.

Lastly, the common bile duct not infrequently opens separately from the pancreatic duct into the duodenum.

CHAPTER II.

PHYSIOLOGICAL CONSIDERATIONS.

THE gall-bladder is an appendage of the liver, and, so far as can be ascertained, plays the rôle of a biliary reservoir, whose function is to store a certain amount of the bile between meals and to expel it during the course of digestion. It would therefore be impossible to consider its physiology without some reference to that of the fluid it holds.

By the kind permission of the Royal Society I am permitted to insert in this volume the details of some original observations bearing on the physiology of the gall-bladder and of the bile, which I made on cases of biliary and gall-bladder fistulae in the human subject. They were published in vol. xlvii. of the *Proceedings of the Royal Society*. (See page 19 *et seqq.*)

The absence of the gall-bladder in the horse and some other animals, and the good health of patients after its removal by cholecystectomy, as in Case 18, clearly prove that its presence is not essential to life; but as it is scarcely consistent with the economy of Nature to provide

beings with purposeless organs, and since the reputed function of the gall-bladder as a reservoir of the bile between the periods of digestion is both rational and probable, we may accept the theory until some better one is discovered. But if the exact nature of its use be not quite clear, we are in no doubt as to the fact, that although gall-stones are probably formed both in the liver and in the gall-bladder, their increase in size nearly always takes place in the gall-bladder alone.

My own experiments, as well as the observations of others, would lead one to believe that the bile is constantly being excreted. According to Beaunis ("Elements de Physiologie," p. 718), the excretion in the cat is effected under a pressure of from 2 to 20 millimetres of mercury, which slight pressure is sufficient to cause it to be forced slowly into the intestine.

In all probability, after digestion is completed the bile flows into the gall-bladder, and when that organ is full, the remainder passes drop by drop into the intestine; but on the resumption of digestion the reserve of bile is gradually expelled by a reflex act.

Since gall-stones are composed principally of cholesterine, frequently combined with

bilirubin-calcium-carbonate, one can easily understand how that, given a nucleus, and some altered condition of bile leading to the deposition of cholesterol, the elements would be present for the more or less rapid growth of concretions. This altered condition of the bile would seem in some cases to be associated with a gouty diathesis.

As in the subjects of cholelithiasis a blockage of the common duct not infrequently occurs, and in consequence a saturation of the system with bile, the observations of M. Bouchard on the poisonous properties of bile have great importance. He says that the bile is nine times more poisonous than urine, and that 4 to 6 cubic c.m. of bile are sufficient to kill one kilogramme of body weight, so that the liver of a man may form in eight hours sufficient poison to kill him. My own observations also support the view that the bile is almost purely an excretion.

One can easily understand, therefore, that blockage of the common duct if at all prolonged becomes a very serious matter, as although the re-absorbed bile is partly thrown off by the kidneys, the blood soon becomes altered and the system poisoned. Should the cystic duct be

blocked, no such immediate serious results ensue, since the bile can pass on into the intestine; but as we know that the mucous membrane of the gall-bladder is lined with mucous follicles, which continue to secrete even when the normal function of the gall-bladder is in abeyance, it will be easily understood how a tumour may form in such circumstances, and how, by a constant accumulation of the gall-bladder secretion, this small hollow organ may attain to an enormous size, and may rupture either spontaneously or as the result of some blow or exertion.

I have in one case seen a similar accumulation of fluid in the liver, due to gall-stones blocking the hepatic duct; aspiration led to the diagnosis of hydatid disease, but exploration revealed a dilatation of the hepatic duct within the liver substance, forming a cavity holding half a pint of fluid resembling the retained secretion of the gall-bladder.

M. A. Dastre (*Arch. de Physiol.*, p. 315, 1890; *Centralbl. f. d. med. Wissenschaft.*, No. 30, 1891; and *Brit. Med. Jour.*, Sept., 1891) finds that in dogs weighing from 9 to 14 kilos (20 to 30 lbs.) the introduction of 100 to 250 grammes of ox bile, or 120 to 230 grammes of dog's bile,

into the stomach, just before or one hour after the taking of food, does not cause any disturbance of digestion or of the general condition of the animal. There is never vomiting, and at most the ox bile causes purging. Five hundred grammes of boiled flesh were given to a dog with a gastric fistula, and one hour afterwards there were introduced into the stomach through the gastric cannula 100 grammes of ox bile. A quarter of an hour afterwards the gastric contents were yellow in colour, and the filtrate had an acid reaction, and contained syntoin.

The filtrate, when added to fibrin, rapidly dissolved the latter. An hour later the gastric contents yielded a clear fluid, also of acid reaction, containing peptone and pepsin. The introduction of large quantities of bile into the stomach is not accompanied by any disturbance or even slowing of the gastric digestive process—so rapid is the secretion of acid that the alkaline reaction of the bile is quickly neutralised. These results confirm those of Oddi, who found that when bile was discharged from the gall-bladder directly into the stomach, gastric digestion was not interfered with. With the view of studying the respective parts played by bile and pancreatic juice in the absorption of

fats, Dastre made experiments on dogs, which were so arranged that only the upper half of the duodenum was moistened with pancreatic juice: that is, only the pancreas discharged its secretion into this part of the gut, while into the lower part of the duodenum—150 c.m. below the pylorus—the bile for the first time entered the duodenum. This was done by connecting the gall-bladder to the lower part of the duodenum, and allowing the two to become united. The result was that the digested food after leaving the stomach was subjected to the action of the pancreatic juice alone in the upper half of the duodenum, while in the lower half it was, in addition, acted on by the bile as well as the pancreatic juice. After the animals recovered from the operation and had remained for months in good condition, they were given a good meal of non-emulsified fat, and were killed by section of the bulb, or narcotised, and their abdominal cavity was opened. In every case the lacteals, as far down as the middle of the duodenum, were transparent, and they only became milky 15 c.m. below where the bile was poured into the duodenum. It would seem from this that the pancreatic juice by itself is unable in the living animal (dog) to convert non-emulsified

fat into an emulsion, but that for this purpose it requires the aid of the bile. This view seems to be confirmed by the results obtained in dogs with a complete biliary fistula—that is, where all the bile was discharged externally—for it was found that all the lacteal vessels were filled with a transparent fluid three hours after a hearty meal of non-emulsified fats. If, however, emulsified fats—for example, milk—are given to a dog with a biliary fistula, then, notwithstanding the exclusion of the bile from the intestine, the lacteals from the stomach to the middle of the large intestine are filled with a milky fluid.

“Observations on the Secretion of Bile in a case of Biliary Fistula.” By A. W. MAYO ROBSON, F.R.C.S. (From the *Proceedings of the Royal Society*, vol. xlvi.)

There are few physiological questions on which so much doubt and disagreement prevail as on that of the secretion and uses of bile, this being especially marked when we come to compare the apparently contradictory observations of various experimenters relating to the action of drugs on the biliary secretion.

As the well-known experiments of Dr.

Rutherford and Messrs. Prévost and Binet were conducted on the lower animals, it may possibly account for the difference between their observations and those recorded in this paper. From the rarity of cases of biliary fistula in healthy human subjects, the opportunity has rarely occurred for a careful analysis of fresh bile in sufficient quantity, or for a complete analysis of the *whole* twenty-four hours' secretion; and in all previous analyses no notice has been taken of the gall-bladder secretion.

In the following cases the fistulae remained open for long periods after the initial operations; the total flow of bile or gall-bladder secretion was carefully collected and accurately measured at different times and for many consecutive hours at a time, and the general good health of the patients was maintained throughout.

Method of Collecting.

The fluid was caught in a light glass flask, into the mouth of which it was guided by means of a celluloid cannula: a substance chosen after several trials with metal ones, on account of its lightness and non-irritating qualities.

CASE I.—*Biliary Fistula.*

Mrs. V. B., aged forty-two, was operated on in January, 1888, for the relief of obstruction in the common bile duct. The incision was made over the gall-bladder, which was brought to the surface, relieved of its contents, and opened, the margin being sutured to the edge of the abdominal wound and drained. The patient made a good recovery from the operation; but a biliary fistula persisted, through which was discharged the whole of the bile for fifteen months. In order to ascertain that the whole of the bile secreted escaped through the fistula, and that none entered the bowel, repeated analyses of the urine and faeces were made, but no evidence of the presence of bile was obtained at any time. The fistula was ultimately closed by stitching the gall-bladder to the bowel, and making a communication between them, thus enabling the bile to reach the intestine by another channel. A detailed description of the case will be found in the *Transactions of the Royal Medical and Chirurgical Society* for 1889.

Influence of Biliary Fistula on Digestion and Nutrition.—During the fifteen months that the fistula was open the patient's digestion

seemed to be unimpaired. The appetite generally was good; there was a craving for acids, such as lemons and pickles, and a dislike to sweet foods, to meat, and to fat. Much fatty matter in her food had a marked effect, producing a sickly feeling, with loss of appetite, and rather more fat than normal was then noticed in the faeces. Her bowels were quite regular without the use of aperients, and the odour of the faeces did not differ from that of healthy motion. Menstruation never occurred during the time the fistula was patent, but as soon as the bile was again turned into the intestine the menstrual function became regular and normal.

CASE II.—*Fistula of Gall-bladder not Biliary.*

Mrs. B., aged thirty-two, was operated on in June, 1884, for distended gall-bladder due to gall-stones, with stricture of the cystic duct; the patient made a good recovery from the operation, but a fistula of the gall-bladder persisted. From this opening a constant flow of a clear and somewhat viscid fluid persisted, which was held to be the normal secretion of the gall-bladder, as there was complete obstruction of the cystic duct, and as no bile constituents were found in the fluid at the time of the operation or subsequently.

Analyses of the fluid from this patient were made in October, 1885, and in April, 1887, by Professor de Burgh Birch, of the Yorkshire College (see *Journal of Physiology*, vol. viii. No. 6), and in March, 1889, by Mr. Fairley, F.C.S., F.R.S.E. In the appended tables (pages 34, 35, 36) will be found Mr. Fairley's analysis of the secretion for twenty-four hours.

The alleged *Diastatic Action* of bile may possibly be due to the admixture of the secretion from the gall-bladder, or from the mucous glands in the large bile ducts. In the gall-bladder fluid from Case II., Professor Birch found a diastatic ferment, concerning which he reported :—"The secretion cannot be regarded as having any important part to play in digestion, the small diastatic action it possesses on starch being shared by many fluids in the economy upon which it does not confer any special digestive value" (*Journal of Physiology*, vol. viii., No. 6).

Antiseptic Action.—In Case I. the value of bile as an antiseptic in the intestine could be tested only by the character of the faeces, which, over a period of fifteen months, during which no bile entered the bowel, did not by odour or aspect indicate any irregular fermentative process. In Case II. the constant clean appearance of the

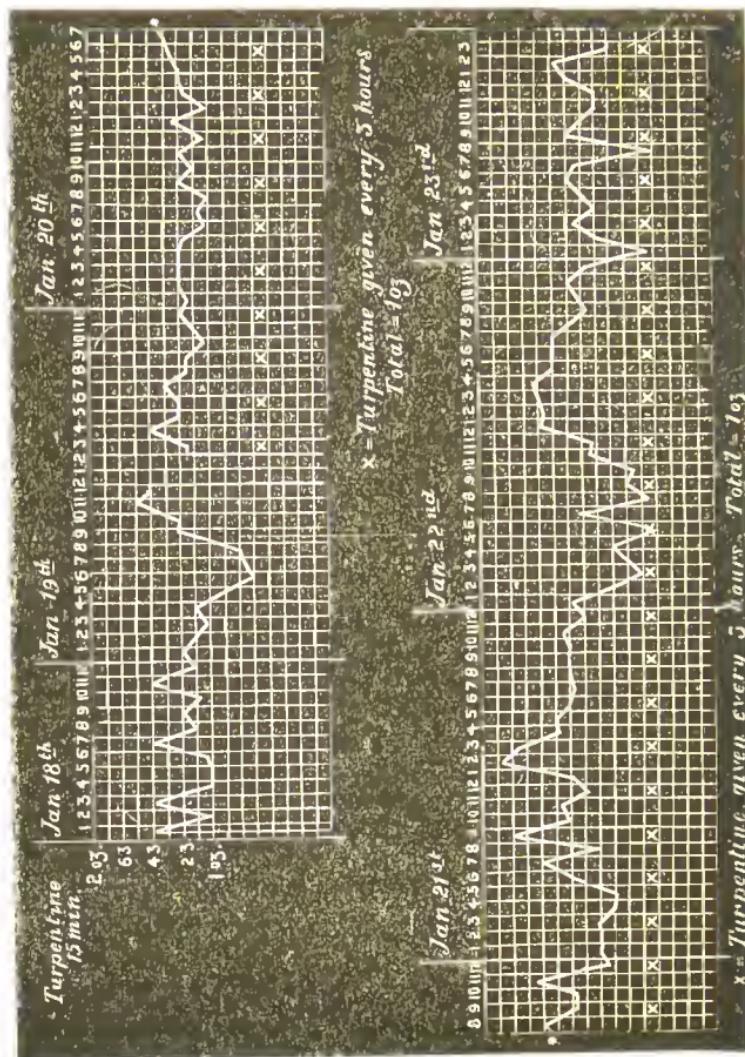


Fig. 1.

edge of the fistula suggested to me the idea that it might be due to the antiseptic quality of the gall-bladder fluid; and the observation that when

collecting the fluid for experimental purposes, I could leave the flasks exposed to the air for several days without any apparent change, suggested the same conclusion. Professor Birch, from numerous cultivation experiments, came to the conclusion that its antiseptic properties were slight, the want of change being rather due to the poverty of the fluid in nourishing materials (*Journal of Physiology*, vol. vii.).

Aperient Action.—In Case I. the bile did not seem to be at all necessary as an intestinal stimulant, for the bowels were quite regular during the whole of the time that no bile was entering the intestines.

Alleged Action of Bile in promoting Absorption.—In Case I. fat could apparently be digested in quantities sufficient not only to maintain normal nutrition and good health, but to lead to an increase in weight. If taken too freely, it seemed to create disturbances of digestion, and to be passed in rather larger quantities than usual in the faeces, as ascertained by careful observation and by separation by means of ether.

Diet.—Details of the daily diet are given in the tables, and may be grouped as follows:—

- I. Oct. 24th—27th. Light diet. Broth, bread, egg, tea, milk, pudding.

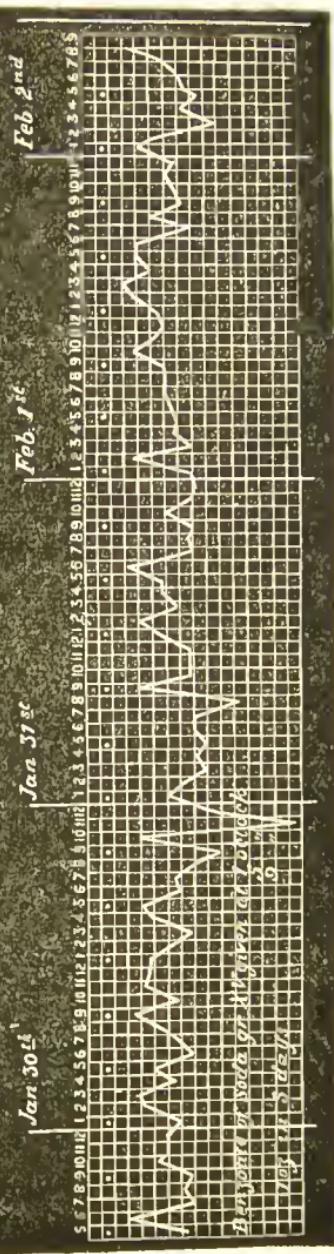
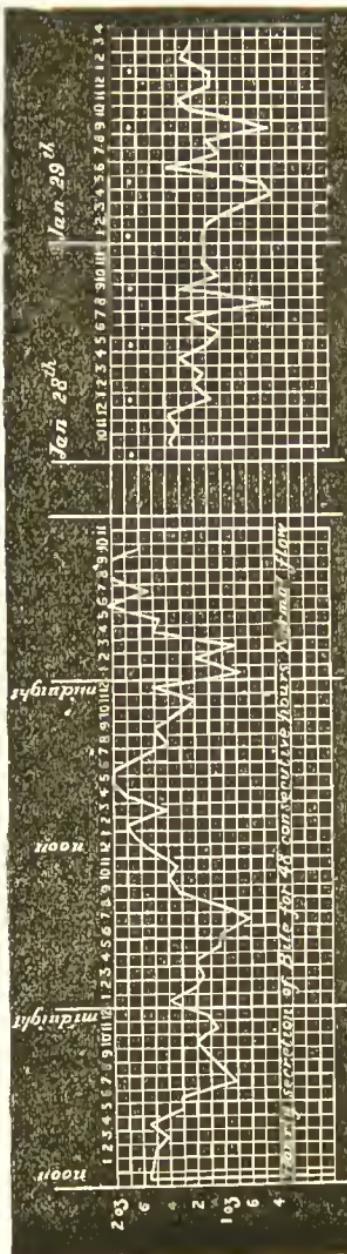


Fig. 5.

- II. Oct. 29th—Nov. 4th. Chicken diet. Broth, bread, egg, tea, milk, pudding, with chicken.
- III. Nov. 5th—8th. Potato diet. Broth, bread, egg, tea, milk, pudding, with potato.
- IV. Nov. 12th. Meat diet. Meat, bread, milk, tea.

Flow of Bile.

The tables appended (page 37 *et seqq.*) show the dates and hours of collection lasting over a period of eight months, the nature and quantity of the diet, and the amount of bile excreted. The charts (Figs. 4, 5, and 6) also show the dates of administering certain medicines, and their effect or absence of effect on the biliary secretion.

In the drawing up of the charts and tables I have been greatly assisted by my friend Mr. C. W. Biden.

Daily Quantity of Bile Flow.—In Case I. the quantity of bile collected in twenty-four hours on various dates in October, November, and December of 1888, and January, February, March, and April of 1889, varied from 39·53 oz. to 25·86 oz., and averaged 29·98 oz., or nearly 30 oz. In Case II. the gall-bladder fluid measured 2·53 oz. in twenty-four hours.

Subtracting this amount from the twenty-four hours' discharge in Case I., we get the average daily flow of bile as 27½ oz.

Diurnal Variation in Flow.—The tables and charts (Figs. 4, 5, and 6) show distinctly that more bile is invariably excreted during the day than at night; the difference at times being as much as 5 oz., at others not more than 3 dr.

In the tables and charts which show an hourly

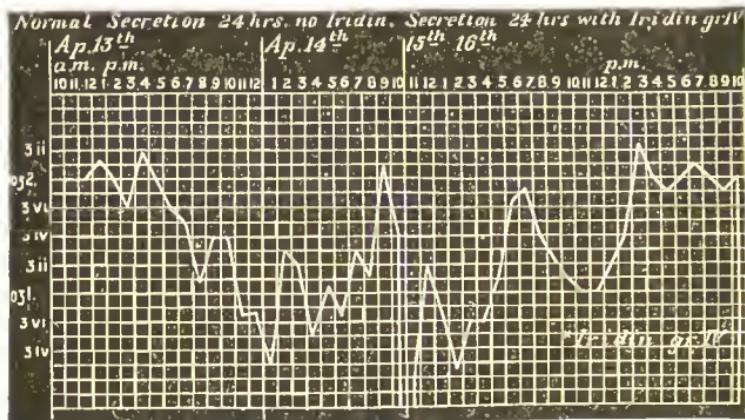


Fig. 6.

collection for over twenty-four hours (Figs. 4, 5, and 6), it is clearly seen that the excretion of bile is continuous night and day. These measurements were carefully and regularly made by the sisters in charge of the ward, under the supervision of the resident surgical officer, Mr. H. Littlewood, F.R.C.S., and my house surgeons, Mr. B. Moynihan, M.B., F.R.C.S., and Mr. F. Hudson, M.R.C.S., to whom I am indebted for the great pains they took over so long a period.

The daily quantity does not correspond with the observations of Von Wittich and Westphalen, who reported a collection of one pint in the twenty-four hours, with but small variations during ten days.

More solids are contained in the bile by night than by day, as is shown by the analysis of the specimens which were examined by Mr. Fairley. (*See appended Tables, page 34, et seqq.*)

The quantity of bile discharged is apparently not much influenced by the ingestion of food. The reception of food into the stomach is generally contemporaneous with a marked decline in the flow of bile, lasting for about two hours. The colour of the fresh bile was always green. The violet odour of turpentine was perceived in the bile soon after its administration.

The Effect of Drugs on the Bile Flow.

The observations made on the effect or non-effect of certain drugs on the biliary secretion show results that are at variance with the usually accepted views of the action of medicines on the liver.

Culomel.—On Nov. 7th, 1888, 5 gr. of calomel were administered at 7 P.M.; a slight aperient effect followed the next morning, but on

comparing the amount of bile excreted before and after, it was found that for ten hours before the administration of the calomel, 12 oz. 6 dr. 20 min. of bile were excreted : and that for ten hours subsequent to the administration, 10 oz. 4 dr. 30 min. were excreted : *i.e.* 2 oz. 1 dr. 50 min. less.

Euonymin.—On Nov. 17th, 4 gr. of euonymin were given at 11.30 A.M.; for the four hours preceding the administration 5 oz. 4 dr. 9 min., and during the four hours subsequent to its administration 5 oz. 1 dr. 8 min., were excreted : *i.e.* 3 dr. less. This dose was repeated on several occasions with similar results.

Rhubarb.—On Nov. 13th, at 11 A.M., $\frac{1}{2}$ oz. of tincture of rhubarb was administered ; during the preceding six hours 7 oz. 3 dr. 23 min. of bile were excreted, and during the six hours subsequent to the administration of the drug 7 oz. 4 dr. 19 min. were excreted : that is, 56 min. more in the subsequent than in the preceding six hours. But on comparing the corresponding period of the previous day, when no rhubarb was given, we find that 8 oz. 6 dr. 10 min., or $1\frac{1}{4}$ oz. more, were excreted. Therefore no increased flow of bile can be put down to the action of the rhubarb.

On Nov. 15th 1 oz. of rhubarb was given.

The figures as seen in the tables again show a diminution, compared with the previous day.

Podophyllin was given on one occasion, and no cholagogue effect was noticed.

Carbonate of Soda.—Soda water, aërated, was given, and produced an increased flow. Its ingestion was followed in two hours by a maintained increased flow, not succeeded by a marked diminution.

Iridin.—On April 16th, 4 gr. of iridin were followed by a good afternoon rise in the bile flow, but two days later there was a much higher afternoon rise when no drug had been given. On April 19th, 4 gr. of iridin gave an effect not so pronounced, the increased flow being intermittent. Apparently, the action of iridin is to increase the flow temporarily, without augmenting the total quantity in twenty-four hours.

Turpentine.—Messrs. Prévost and Binet state that turpentine and its derivatives promote a notable increase in the excretion. In order to test this, a turpentine capsule, containing 15 min. of the oil of turpentine, was given every four hours night and day.

On Jan. 18th no drug given. 27 oz. 6 dr. 35 min. were excreted in twenty-four hours. On Jan. 19th and 20th, during the administration of

turpentine capsules, 28 oz. 5 dr. 41 min. were excreted: that is, an increase of 7 dr. During the following twenty-four hours, the capsules being continued, 30 oz. 2 dr. 10 min. were excreted.

During the third period of twenty-four hours with the capsules, 26 oz. 57 min. were excreted; and during the fourth twenty-four hours 27 oz. 45 min.

Therefore, although an increase was apparent on the second day, the daily amount of bile discharged in the twenty-four hours was not so much as on many days when no turpentine was being given, as, for instance, on Oct. 27th and 29th, when it was over 30 oz.

Benzoate of Soda.—Messrs. Prévost and Binet state that the administration of benzoate of soda to dogs increased the amount of bile to two or three times the normal. This I do not find to be the result in Case I., as the table and charts appended will show, where no positive increase is seen.

Conclusions.

First.—The bile is probably chiefly excretitious, and, like the urine, is constantly being formed and cast out.

Second.—Though the bile probably assists

in the absorption of fats, its presence in the intestine is not necessary for the digestion of such an amount of fat as is capable of supporting life and keeping up nutrition.

Third.—Increase in body weight and good health are quite compatible with the entire absence of bile from the intestines.

Fourth.—The antiseptic properties of the bile are unimportant.

Fifth.—Whatever little antiseptic quality bile may have is probably derived from its admixture with the gall-bladder fluid.

Sixth.—The supposed stimulating effect of the bile on the intestinal walls is not necessary for a regular action of the bowels.

Seventh.—The quantity of bile excreted in the twenty-four hours during health, in a person of average weight, may vary between 39 oz. 4 dr. and 25 oz. 6 dr., with an average of 30 oz., less the $2\frac{1}{2}$ oz. of fluid secreted by the gall-bladder.

Eighth.—More bile is excreted during the day than at night, the excess varying between 5 oz. and 3 dr.

Ninth.—The excretion of bile seems to go on constantly and with great regularity.

Tenth.—The excretion is apparently not materially influenced by diet.

Eleventh.—The pigment of fresh human bile is biliverdin.

Twelfth.—The supposed cholagogues investigated seem to rather diminish than increase the amount of bile excreted.

Mr. Fairley's Analysis.

Analysis of bile drawn from biliary fistula (Mrs. V. B.), collected April 13th, 10 A.M. to 10 P.M., and April 13th to 14th, 10 P.M. to 10 A.M., 1889.

Columns I., II., III. refer to the whole bile and gall-bladder fluid; Column I. first twelve hours; Column II. second twelve hours; and Column III. the whole fluid collected during twenty-four hours. Column IV. gives the composition of the bile calculated without the gall-bladder fluid.

I.	II.	III.	IV.
12 hours' bile, 10 A.M. to 10 P.M. April 13.	12 hours' bile, 10 P.M. to 10 A.M. April 13—14.	24 hours' bile, 24 hours' bile, April 13—14.	24 hours' bile, corrected for gall-bladder fluid.
Quantity	570 c.c.	370 c.c.	940 c.c.
Specific gravity . . .	1.0085	1.0090	1.0087
Reaction	Alkaline.		1.0086

The bile contains in 1000 parts:—

Water	982.10	981.79	981.98	981.76
Total solids	17.90	18.21	18.02	18.24
	1000.00	1000.00	1000.00	1000.00

The solid matter of the bile contains :—

	I. 12 hours' bile, 10 A.M. to 10 P.M. April 13.	II. 12 hours' bile, 10 P.M. to 10 A.M. April 13—14.	III. 24 hours' bile, corrected for gall-bladder April 13—14.	IV. 24 hours' bile, corrected for gall-bladder April 13—14.
Cholesterin	0·44	0·45	0·45	0·45
Fatty matter (free)	0·11	0·12	0·12	0·12
Fat combined (chiefly sodium stearate)	0·90	1·08	0·97	0·97
Sodium glyco- cholate	7·45	7·60	7·51	7·51
Sulphur equal to sodium tauro- cholate	0·087	0·094	0·09	0·09
Organic substances precipitated by alcohol, chiefly mucus and epi- thelium	1·31	1·29	1·30	0·85
Chlorides equal to sodium chloride .	5·08	4·91	5·01	4·95
Carbonates and phosphates of sodium, potas- sium, lime, mag- nesia, and iron . .	2·52	2·66	2·57	2·54
Copper . . . . .	..	minute trace	..	trace
Silica . . . . .	..	trace	..	trace
Sulphates } Urea } Sugar } . . . . .	..	none	..	none

The solid matter of the bile gave "on ignition":—

Ash per 1000 parts	8·15	8·68	8·36	8·34
--------------------	------	------	------	------

The above analysis of the bile was confirmed by a further quantitative analysis of the bile taken five days later.

The average quantity of bile as ascertained by observations extending over eight months was 30 ounées (very nearly 862 e.c.) during twenty-four hours.

Analysis of fluid from the gall-bladder (collected during twenty-four hours).

Mrs. A.). Received April 29, 1889.

Quantity . . . . .	. 72 c.c.
Specific gravity . . . . .	. 1.0095
Reaction	Alkaline.

The fluid contains in 1000 parts :—

Water . . . . .	. 984.64
Total solids *	. 15.36

The solid matter contains :—

Organic matter, chiefly mucin with trace of albumen .	6.72
Chlorides equal to sodium chloride	5.73
Sodium carbonate	2.20
Other salts, containing phosphates, potassium salts, etc.	0.71

*.

* The solid matter was carefully dried until its weight was constant, and on ignition gave 8.64 parts of ash.

SCHEDULE SHOWING AMOUNT OF VARIATION IN FLOW OVER A PERIOD DUE TO THE DRUG.

Drug.	Duration of observing period.	Difference in flow from			Actual flow during period stated with drug.			Date.
		The preceding period same day.	Contemporaneous period previous day.	oz. dr. min.	oz. dr. min.	oz. dr. min.	oz. dr. min.	
Calomel	-2	1 50	+1 0 20	10 4 30	Nov. 7	
Rhubarb	+0 0	56	-1 1 51	7 4 19	"	13
	+0 4	51	-2 6 46	7 3 24	"	15
	-0 3	1	-0 2 12	5 1 8	Jan. 19	
	24	...	+0 7 6	28 5 41	"	17
Euonymin...	+1 4 29	30 2 10	"	20
Turpentine	-4 1 13	26 0 57	"	21
"	+0 7 48	27 0 45	"	22
"	-1 4 30	26 1 5	"	28
Soda benzoate	+3 5 10	29 6 15	"	29
"	-3 3 10	26 3 5	"	30
"	+2 1 15	28 4 20	"	31
"	+2 0 25	30 4 45	Feb. 1	

Minus = decrease of "so much," possibly due to drug.
Plus = increase of "so much," possibly due to drug.

Mrs. V. B. Age 42. Daily Excretion of Bile.

<i>Oct. 24—</i>		oz.	dr.	min.
12—1 P.M.	Fish, 6 oz.; pudding	1	4	59
1—2	... ... ...	1	4	30
2—3	... ... ...	1	1	40
3—4	... ... ...	1	1	40
4—5	Tea, 14 oz.; bread, 5½ oz.; egg, 1	1	1	0
5—6	... ... ...		7	0
6—7	... ... ...	1	3	0
7—8	Milk, 1 pint	1	2	0
8—9	... ... ...	1	2	46
9—10	... ... ...	1	2	0
10 P.M.—7 A.M.	Milk, 1 pint	6	5	0
7—8	Tea, 16 oz.; bread, 5½ oz. ...	1	2	30
8—9	... ... ...	1	4	0
9—10	... ... ...	1	2	40
10—11	Beef tea, 1 pint	1	3	30
11—12 noon	... ... ..	1	2	0

	oz.	dr.	min.
Total quantity excreted in 24 hours	26	2	15
From 10 P.M. to 10 A.M.	10	6	10
,, 10 A.M. to 10 P.M.	15	4	5

<i>Oct. 25—</i>		oz.	dr.	min.
10—11	Beef tea, 1 pint	1	3	30
11—12 noon	... ... ...	1	2	0
12—1	... ... ...	1	1	45
1—2	... ... ...	1	1	40
2—3	... . .	1	2	0
3—4	Tea, 10 oz.; bread, 6 oz.; egg, 1	1	0	30
4—5	... ... ...	1	1	0
5—6	... ... ...	1	3	0
6—7	Chicken broth, 12 oz.	1	4	0
7—8	... ... ...	1	1	0
8—9	... ... ...	1	3	0
9—1	Milk, 1 pint		7	0
10—5 A.M.	... ... ...	7	5	0
5—6	... ... ...	1	1	30
6—7	... ... ...	1	0	30
7—8	Tea, 10 oz.; bread, 4½ oz. ...	1	2	0
8—9	... ... ...	1	3	0
9—10	... ... ...	1	4	0

	oz.	dr.	min.
10 A.M. to 10 P.M.	14	6	25
10 P.M. to 10 A.M.	14	0	0
	28	6	25

Mrs. V. B. Age 42. Daily Excretion of Bile.

<i>Oct. 26—</i>		oz.	dr.	min.
10-11	...	1	2	25
11-12 noon	...	1	4	0
12-1	Broth, 18 oz. ; pudding, 11 oz.	1	0	37
1-2	Bread, 1 oz. ...	1	3	30
2-3	...	1	2	0
3-4	...	1	4	0
4-5	Tea, 16 oz. ; bread, 5 oz. ; egg, 1	1	0	35
5-6	...	1	4	0
6-7	...	1	0	40
7-8	Milk, 1 pint ...	6		50
8-9	...	1	2	15
9-10	...	1	2	0
10-5 A.M.	Milk, 1 pint ...	7	6	0
5-6	...	1	2	0
6-7	Tea, 10 oz. ; bread, 4½ oz. ...	1	0	0
7-8	...	1	0	0
8-9	...	1	5	0
9-10	...	1	4	35
oz. dr. min.				
10 A.M. to 10 P.M.	...	15	0	52
10 P.M. to 10 A.M.	...	14	1	35
		29	2	27
<i>Oct. 27—</i>		oz.	dr.	min.
10-11	...	1	4	35
11-12 noon	Broth, 17 oz. ; pudding 7½ oz. ...	1	4	0
12-1	...	1	0	0
1-2	...	1	0	0
2-3	...	1	2	10
3-4	...	1	3	33
4-5	Tea, 17 oz. ; bread, 5 oz. ; egg, 1	1	2	0
5-6	...	1	4	0
6-7	...	1	2	0
7-8	Milk, 19 oz. ...	1	2	50
8-9	...	1	0	0
9-10	...	1	2	0
10-5 A.M.	...	7	6	0
5-6	...	1	0	0
6-7	...	1	2	55
7-8	Tea, 16 oz. ; bread, 5½ oz. ; milk, 10 oz.	1	4	0
8-9	...	1	4	0
9-10	...	1	5	0
10-11	...	1	2	50
11-12	...	1	4	45
oz. dr. min.				
10 A.M. to 10 P.M.	...	15	3	8
10 P.M. to 10 A.M.	...	14	5	55
		30	1	3

Mrs. V. B. Age 42. Daily Excretion of Bile.

Oct. 29—		oz.	dr.	min.
7—8	Tea, 10 oz. ...	1	2	45
8—9	Bread, 5 oz. ...	2	0	0
9—10	Milk, 9 oz. ...	1	5	40
10—11	... ... ...	1	3	0
11—12 noon	... ... ...	1	1	0
12—1	Chicken, 7 oz.; pudding, 6 oz. ...	1	5	11
1—2	... ... ..	1	4	0
2—3	... ... ..	1	4	0
3—4	... ... ..	1	3	0
4—5	Tea, 15 oz.; bread, 5½ oz.; egg, 1 ...	1	2	50
5—6	... ... ..	1	2	0
6—7	Milk, 12 oz. ...	1	0	57
7—8	... ... ..	1	3	30
8—9	... ... ..	1	3	57
9—10	Milk, 10 oz. ...	1	1	25
10—5 A.M.	Milk, 18 oz. ...	8	1	50
5—6	... ... ..	1	1	50
6—7	... ... ..	1	0	40
7—8	Tea, 15 oz.; bread, 5½ oz. ...	1	0	35
8—9	Bread, 5½ oz. ...	1	4	40
9—10	... ... ..	1	2	0
oz. dr. min.				
10 A.M. to 10 P.M.	... ... ..	16	2	50
10 P.M. to 10 A.M.	... ... ..	14	3	35
		30	6	25

Oct. 30—		oz.	dr.	min.
10—11	... ... ..	1	3	30
11—12 noon	Chicken, 6 oz. ...	1	3	25
12—1	... ... ..	1	2	0
1—2	... ... ..	1	3	10
2—3	... ... ..		
3—4	Tea, 17 oz.; bread ...	1	0	42
4—5	... ... ..	1	4	0
5—6	... ... ..	1	6	46
6—7	Milk, 11 oz. ...	1	2	0
7—8	... ... ..	1	1	1
8—9	... ... ..	1	2	0
9—10	... ... ..	1	2	40
10—5	Milk, 1 pint ...	7	6	6
5—6	... ... ..	7		50
6—7	... ... ..	1	2	0
7—8	Tea, 15 oz.; bread, 5½ oz. ...	1	3	0
8—9	... ... ..	1	5	1
9—10	Milk, 12 oz. ...	1	4	0
oz. dr. min.				
10 A.M. to 10 P.M.	... ... ..	14	7	14
10 P.M. to 10 A.M.	... ... ..	14	3	57
		29	3	11

Mrs. T. B. Age 42. Daily Excretion of Bile.

Oct. 31—		oz.	dr.	min.
10—11		1	4	0
11—12 noon		1	1	20
12—1	Chicken, 6 oz.; pudding, 11 oz.; milk, 8 oz.	1	2	25
1—2	...	1	2	35
2—3	...	1	3	0
3—4	Tea, 10 oz.; bread, 5 oz.	1	3	0
4—5	...	1	2	0
5—6	...	1	1	20
6—7	Milk, 18 oz.	1	3	25
7—8	...	7	32	
8—9	...	1	0	17
9—10	...	7	50	
10—5 A.M.	Milk, 1 pint	6	6	0
5—6	...	1	3	0
6—7	...	1	4	0
7—8	Tea, 15 oz.; bread, 5½ oz.	1	3	0
8—9	...	1	3	50
9—10	...	1	3	45

	oz.	dr.	min.
10 A.M. to 10 P.M.	14	6	44
10 P.M. to 10 A.M.	13	7	35
	28	6	19

Nov. 1—		oz.	dr.	min.
10—11	Milk, 12 oz.	1	0	45
11—12 noon	...	1	2	55
12—1	Chicken, 12 oz.; pudding, 9 oz.	1	5	0
1—2	...	1	2	35
2—3	...	1	4	0
3—4	Tea, 20 oz.; bread, 5½ oz.; egg, 1.	1	3	0
4—5	...	1	0	0
5—6	...	1	3	0
6—7	Milk, 15 oz.	1	1	10
7—8	...	1	4	0
8—9	...	1	0	59
9—10	...	1	1	25
10—5 A.M.	...	7	4	30
5—6	...	1	1	0
6—7	...	1	0	30
7—8	Tea, 20 oz.; bread, 6½ oz.	7	0	
8—9	...	1	5	10
9—10	...	1	4	0

	oz.	dr.	min.
10 A.M. to 10 P.M.	15	4	49
10 P.M. to 10 A.M.	13	6	10
	29	2	59

Mrs. V. B. Age 42. Daily Excretion of Bile.

<i>Nov. 2—</i>		oz.	dr.	min.
10—11	Milk, 20 oz....	1	5	10
11—12 noon	Chicken & bread, 6 oz.; pudding, 11 oz.	1	2	40
12—1	...	1	1	0
1—2	...	1	6	0
2—3	...	1	2	19
3—4	...	1	1	2
4—5	Tea, 9 oz.	1	4	0
5—6	...	1	4	0
6—7	Milk, 15 oz.	1	2	3
7—8	...	5		2
8—9	...	1	0	40
9—10	...	7		35
10—5 A.M.	...	6	4	0
5—6	...	1	1	10
6—7	...	7		39
7—8	...	1	0	35
8—9	...	1	4	17
9—10	...	1	4	50

	oz.	dr.	min.
10 A.M. to 10 P.M. ...	15	1	31
10 P.M. to 10 A.M. ...	12	6	31
	28	0	2

<i>Nov. 3—</i>		oz.	dr.	min.
10—11	Milk, 9 oz.	1	1	0
11—12 noon	...	1	1	15
12—1	Chicken, 6½ oz.; pudding, 6½ oz.	1	1	15
1—2	...	1	7	50
2—3	...	1	0	0
3—4	Tea, 15 oz.; bread, 6 oz.; egg, 1 ...	1	1	30
4—5	...	1	4	0
5—6	...	1	4	0
6—7	Milk, 9 oz.	6		0
7—8	Euonymin, gr. jss., at 7 p.m.	1	3	10
8—9	...	1	2	0
9—10	...	1	1	32
10—5 A.M.	...	8	1	0
5—6	...	1	1	40
6—7	...	1	1	40
7—8	Tea, 11 oz.; bread, 4 oz.	1	0	0
8—9	...	1	6	0
9—10	...	1	4	0

	oz.	dr.	min.
10 A.M. to 10 P.M. ...	15	1	32
10 P.M. to 10 A.M. ...	14	6	20
	29	7	52

Mrs. T. B. Age 42. Daily Excretion of Bile.

		oz.	dr.	min.
Nov. 4—				
10—11	Milk, 9 oz.	1	2	0
11—12 noon	... ...	1	1	0
12—1	Chicken, 6 oz.; pudding, 9 oz.; milk, 9 oz.	1	2	0
1—2	... ...	1	5	0
2—3	... ...	1	4	45
3—4	Bread, 3 oz.; tea, 16 oz.; egg, 1...	0	6	0
4—5	... ...	1	1	0
5—6	... ...	1	4	0
6—7	... ...	1	0	0
7—8	... ...	1	2	0
8—9	... ...	1	1	0
9—10	Euonymin, gr. iij., at 10:30 P.M....	1	0	15
10—5 A.M.	Milk, 1 pint.	7	0	10
5—6	... ...	1	0	36
6—7	... ...	1	3	5
7—8	Tea, 10 oz.; bread, 6 oz.	1	0	45
8—9	... ...	1	0	0
9—10	Milk, 9 oz.	1	0	0

	oz.	dr.	min.
10 A.M. to 10 P.M.	14	5	0
10 P.M. to 10 A.M.	12	4	36
	27	1	36

		oz.	dr.	min.
Nov. 5—				
10—11	... ... ...	1	2	0
11—12 noon	... ...	1	0	40
12—1	Chicken and potato, 8 oz.; pudding ...	1	4	0
1—2	... ...	1	2	25
2—3	... ...	1	1	40
3—4	Tea, 16 oz.; bread, 6 oz.; egg, 1...	1	1	15
4—5	... ...	1	3	0
5—6	... ...	1	2	50
6—7	Milk, 10 oz.	1	1	0
7—8	... ...	1	0	25
8—9	... ...	0	7	0
9—10	... ...	1	6	55
10—5 A.M.	Milk, 1 pint	7	0	0
5—6	... ...	1	0	0
6—7	... ...	0	7	0
7—8	Tea, 16 oz.; bread, 4½ oz.	1	3	10
8—9	... ...	1	2	0
9—10	... ...	1	4	0

	oz.	dr.	min.
10 A.M. to 10 P.M.	15	1	10
10 P.M. to 10 A.M.	13	0	10
	28	1	20

Mrs. V. B., Age 42. Daily Excretion of Bile.

Nov. 6—		oz.	dr.	min.
10—11	Milk, 8 oz.	1	1	20
11—12 noon	Chicken and potato, 7 oz.; pudding, 8 oz.	1	2	25
12—1	...	1	4	0
1—2	...	1	1	50
2—3	...	1	1	0
3—4	Tea, 10 oz.; bread, 6 oz.	1	1	10
4—5	...	1	0	0
5—6	...	1	3	0
6—7	Milk, 10 oz.	1	2	0
7—8	...	1	3	0
8—9	...	1	0	0
9—10	...	1	0	5
10—5 A.M.	Milk, 1 pint	6	1	5
5—6	...	0	1	30
6—7	...	0	3	0
7—8	Tea, 11 oz.; bread, 4½ oz.	1	1	30
8—9	...	1	5	0
9—10	Milk, 8 oz.	1	4	0
oz. dr. min.				
10 A.M. to 10 P.M.	...	14	6	50
10 P.M. to 10 A.M.	...	11	0	5
		25	6	55

Nov. 7—		oz.	dr.	min.
10—11	...	1	2	0
11—12 noon	Chicken and potato, 8 oz.	1	0	0
12—1	...	1	2	0
1—2	...	1	2	0
2—3	...	1	2	20
3—4	Tea, 16 oz.; bread, 6 oz.; egg, 1	1	2	0
4—5	...	1	2	10
5—6	...	1	3	10
6—7	Milk, 17 oz.	1	2	40
7—8	Calomel, gr. v.	1	0	0
8—9	...	1	0	0
9—10	...	0	6	0
10—5 A.M.	...	7	6	30
5—6	...	1	0	0
6—7	...	0	6	35
7—8	Tea, 16 oz.; bread, 4½ oz.	0	7	0
8—9	...	1	2	0
9—10	Milk, 10 oz.	1	3	0
oz. dr. min.				
10 A.M. to 10 P.M.	...	14	0	20
10 P.M. to 10 A.M.	...	13	1	5
		27	1	25
At 7 P.M., calomel, gr. v. 10 hours before	...	12	6	20
10 hours after	...	10	4	30
Corresponding 10 hours after on previous day	...	9	4	10

Mrs. V. B. Age 42. Daily Excretion of Bile.

			oz.	dr.	min.
Nov. 8—					
10—11	...	...	1	2	40
11—12 noon	Chicken and potato, 8 oz.; milk, 8 oz.; gravy, 1 oz.	...	1	0	0
12—1	...	...	1	2	0
1—2	...	...	1	1	30
2—3	...	...	1	4	0
3—4	Tea, 19 oz.; bread, 2½ oz.; egg, 1	...	1	1	25
4—5	...	...	1	1	55
5—6	...	...	1	3	20
6—7	...	...	1	2	0
7—8	...	...	1	4	0
8—9	...	...	1	1	0
9—10	...	...	1	0	20
10—5 A.M.	Milk, 16 oz.	...	6	6	0

		oz.	dr.	min.
10 A.M. to 10 P.M.	...	15	0	10
10 P.M. to 10 A.M.	...	12	6	25
		27	6	35

			oz.	dr.	min.
Nov. 9—					
5—6	...	...	1	1	50
6—7	...	...	1	2	0
7—8	Tea, 19 oz.; bread, 4½ oz.	...	1	1	55
8—9	...	...	1	3	40
9—10	Milk, 10 oz.	...	0	7	0
10—11	...	...	1	1	0
11—12	Chicken and potato, 8 oz.; pudding, 8 oz.	...	1	1	15
12—1	...	...	1	1	45
1—2	...	...	1	2	0
2—3	...	...	1	1	35
3—4	Tea, 12 oz.; bread, 4½ oz.	...	1	4	0
4—5	...	...	5	0	
5—6	...	...	1	1	25
6—7	...	...	1	1	5
7—8	...	...	1	0	0
8—9	...	...	1	2	0

		oz.	dr.	min.
9 A.M. to 9 P.M.	...	13	4	5

Mrs. V. B. Age 42. Daily Excretion of Bile.

Nov. 12—		oz.	dr.	min.
9—12 noon	Milk, 1 pint	3	4	0
12—1	Meat, etc., 16 oz.; water, 10 oz....	1	3	2
1—2	...	1	2	2
2—3	...	1	3	1
3—4	Tea, 20 oz.; bread, 2 oz.	1	4	2
4—5	...	1	6	3
5—6	...	1	6	2
6—7	...	1	4	1
7—8	...	1	4	2
8—9	...	1	2	1

	oz.	dr.	min.
9 A.M. to 9 P.M.	16	6	16

Nov. 13—		oz.	dr.	min.
5—6 A.M.	...	1	3	0
6—7	...	1	0	10
7—8	...	7		5
8—9	Tea, 1 pint; bread, 4 oz.	1	4	4
9—10	...	1	4	3
10—11	Milk, 10 oz.	1	1	1
11—12	Tinct. rhei, 5ss.	6		5
12—1	Meat, etc., 10 oz.; water, 10 oz....	1	2	1
1—2	...	1	0	2
2—3	...	1	0	0
3—4	...	1	6	3
4—5	Tea, 1 pint; bread, 1 oz.	1	6	8
5—6	...	1	0	8
6—7	...	1	2	6
7—8	Milk, 15 oz.; bread, 2 oz.	1	0	0
8—9	...	1	1	8
9—10	...	1	2	0

	oz.	dr.	min.
5 A.M. to 11 A.M.	7	3	23
At 11, tinct. rhei, 5ss.			
11 A.M. to 5 P.M.	7	4	19
9 A.M. to 9 P.M.	14	4	45
(Cf. 9th and 12th November and 14th and 15th November.)			
10 A.M. to 10 P.M.	14	2	42
10 P.M. to 10 A.M. not measured.			

Nov. 14—	oz.	dr.	min.
6 A.M. to 6 P.M.	16	6	37
9 A.M. to 9 P.M.	17	7	45
11 A.M. to 5 P.M.	9	6	11
12 A.M. to 6 P.M.	10	2	10

Mrs. V. B. Age 42. Daily Excretion of Bile.

<i>Nov. 15—</i>				oz.	dr.	min.
6—7 A.M.	...	...	..	1	2	0
7—8	...	...	...		6	4
8—9	Tea, 20 oz.; bread, 2 oz.	...	...	1	0	8
9—10	...	...	...	1	0	5
10—11	Milk, 10 oz.	...	...	1	6	10
11—12	Tinct. rhei, ʒj.	...	...	1	0	6
12—1	Meat, etc., 12 oz.; water, 10 oz.	...	...	1	2	4
1—2	...	...	..	1	2	0
2—3	...	...	...	1	4	2
3—4	...	...	...	1	2	8
4—5	Tea, 20 oz.; bread, 1½ oz.	...	...	1	0	10
5—6	...	...	...	1	1	0
6—7	...	...	...	1	7	3
7—8	Milk, 15 oz.; bread, 1 oz.	...	...	1	5	4
8—9	...	...	...	1	0	5
9—10	...	...	...	1	1	0

oz. dr. min.

At 11½ Tinct. rhei, ʒj.

6 A.M. to 12	...	...	...	6	6	33
12 to 6 P.M.	...	...	...	7	3	24
9 A.M. to 9 P.M.	...	...	...	15	5	57

<i>Nov. 16—</i>				oz.	dr.	min.
6—7 A.M.	...	...	..	1	2	0
7—8	...	...	...	1	2	8
8—9	Tea, 20 oz.; bread, 6 oz.	...	...	1	4	6
9—10	...	...	...	1	3	2
10—11	Milk, 10 oz.	...	...	
11—12	...	...	...	2	7	3
12—1	Meat, 16 oz.	...	...	1	2	5
1—2	...	...	...	1	4	3
2—3	Water, 10 oz.	...	...	1	4	7
3—4	...	...	...	1	1	5
4—5	Tea, 20 oz.; bread, 3 oz.	...	...	1	4	3
5—6	...	...	...	1	5	4
6—7	...	...	...	1	0	3
7—8	Milk, 15 oz.; bread, 2 oz.	...	...	7	5	
8—9	...	...	...	1	1	7

oz. dr. min.

6. A.M. to 6 P.M.

16 6 46

Mrs. V. B. Age 42. Daily Excretion of Bile.

<i>Nov. 17—</i>			oz.	dr.	min.
7—8	...	...	1	2	4
8—9	Tea, 20 oz.; bread, 7 oz.	...	1	6	1
9—10	...	...	1	2	1
10—11	Milk, 10 oz.	...	1	2	3
11—12	Euonymin, gr. iv.	...	1	3	4
12—1	Meat, etc., 16 oz.; water, 10 oz.	...	1	2	5
1—2	...	...	1	2	0
2—3	...	...	1	3	0
3—4	...	...	1	2	3
4—5	Tea, 20 oz.; bread, 2 oz.	...	1	3	5
5—6	...	...	1	4	7
6—7	...	...	2	2	0
7—8	Milk, 15 oz.; bread, 2 oz.	...	1	1	1
8—9	...	...	1	0	3
9—10	...	...	1	3	0

		oz.	dr.	min.
7 A.M. to 11 A.M.	5	4
At 11 $\frac{1}{2}$, euonymin, gr. iv.			1	9
12 to 4 P.M.	5	8
10 A.M. to 10 P.M.	16	3
				31

Hour of the day.	Jan. 18 and 19.*			Jan. 19 and 20.			Jan. 20 and 21.			Jan. 21 and 22.			Jan. 22 and 23.			
	oz.	dr.	min.	oz.	dr.	min.	oz.	dr.	min.	oz.	dr.	min.	oz.	dr.	min.	
Noon. 12-1	1	4	0	1	0	0	1	2	0	1	2	11	1	4	10	
E 1-2	2	3	0	1	4	0	1	4	0	1	3	0	1	3	0	
3-4	1	0	0	1	0	0	1	2	10	1	2	0	1	3	0	
4-5	1	0	0	1	0	25	1	2	0	1	2	0	1	3	0	
5-6	6	7	0	1	4	0	1	3	0	1	2	0	1	3	0	
6-7	7	8	0	1	1	0	1	1	3	10	1	2	0	1	3	0
7-8	8	9	0	1	2	0	1	1	30	1	2	0	1	2	0	
8-9	9	10	0	1	0	40	1	0	25	1	1	40	1	0	40	
9-10	10	11	0	1	4	0	1	1	40	1	1	40	1	1	20	
10-11	11	12	0	1	1	20	1	1	40	1	1	40	1	1	20	
11-12	12	1	0	1	2	40	1	1	2	0	1	2	0	1	2	0
Noon 12-1	1	2	0	1	0	0	1	0	0	1	1	0	1	2	0	
1-2	2	3	0	1	1	0	1	2	0	1	2	0	1	1	30	
2-3	3	4	0	1	1	0	1	2	0	1	2	0	1	1	30	
3-4	4	5	0	1	1	0	1	1	50	1	6	55	1	1	0	
4-5	5	6	0	1	0	25	1	1	45	1	1	45	1	1	0	
5-6	5	45	0	1	0	50	1	1	40	1	1	30	1	1	30	
6-7	6	7	0	1	1	0	1	1	0	1	1	0	1	1	0	
7-8	7	8	0	1	2	20	1	1	2	6	0	0	1	2	0	
8-9	8	9	0	1	1	20	1	1	0	1	1	0	1	1	0	
9-10	9	10	0	1	1	20	1	1	0	1	1	0	1	1	0	
10-11	10	11	0	1	1	50	1	1	2	42	1	0	30	1	0	0
11-12	11	12	0	1	1	40	1	1	0	40	1	1	20	1	0	0
Noon 12-1	12	1	0	1	2	40	1	1	2	0	1	1	0	1	2	0
1-2	2	3	0	1	0	0	1	0	0	1	6	43	1	3	40	
Total amt. of bile in 24 hours	27	6	35	28	5	41	30	2	10	26	0	57	27	0	45	

* Or turpentine given these 2½ hours. † Meas. s 15 min. of turpentine given at beginning of hours.

E - 30

Hour of the day.	Jan. 28 and 29,	Jan. 29 a. d. 30,	Jan. 30 and 31.	Jan. 31 and Feb. 1.	Feb. 1 and 2.
	oz, dr. min.	oz, dr. min.	oz, dr. min.	oz, dr. min.	oz, dr. min.
9-10	*1 3 30	*1 2 0	*1 1 5	*1 0 10	*1 1 15
10-11	1 3 0	1 3 0	1 3 50	1 0 20	1 2 40*
11-12	1 3 50	1 0 40	1 3 30	1 0 20	1 2 0
Noon.	1 0 40	1 0 40	1 3 15	1 2 40	1 2 35
12-1	*1 2 0	*1 2 45	*1 1 45	*1 4 0	*1 4 10
1-2	1 1 5	1 2 5	1 0 10	1 1 10	1 5 5
2-3	Not collected (say)	1 0 0	1 3 0	1 2 25	1 3 0
3-4	1 3 0	1 0 0	1 4 0	1 2 25	1 4 0
4-5	1 0 50	1 0 40	1 1 0	*1 5 5	-1 4 25
5-6	*1 0 0	+1 5 0	1 1 30	1 0 0	1 0 0
6-7	1 2 30	1 0 0	1 0 40	1 0 25	1 3 0
7-8	1 4 0	1 0 45	1 6 0	1 0 0	1 0 40
8-9	1 3 10	1 0 20	-1 2 40	*1 2 0	-1 1 20
9-10	*1 0 0	*1 2 40	1 2 25	1 0 0	1 2 0
10-11	1 1 25	1 2 0	1 2 0	1 7 50	1 1 15
11-12	1 1 0	1 2 0	7 0		Feb. 2.
		Jan. 29,	Jan. 30,	Jan. 31,	
Midut.	12-1	1 1 20	1 1 0	1 2 0	
1-2	*1 0 45	*1 3 40	*1 1 0	*1 5 20	
2-3	6 45	1 4 24	7 0	1 5 0	
3-4	4 0	1 1 30	7 45	1 1 20	
4-5	5 0	1 3 20	7 0	*1 1 30	
5-6	*1 4 0	+1 0 0	*1 0 0	*1 2 0	
6-7	7 50	1 1 0	1 4 45	1 2 11	
7-8	1 1 5	1 2 10	1 4 10	1 2 0	
8-9	4 20	1 4 40			
Total amt. of bile } in 24 hours.	26 1 5	29 6 15	26 3 5	28 4 20	30 4 45

* Benzoate of sodium, gr. xv., administered.

Hourly Secretion of Bile for 48 Consecutive Hours. Normal.

<i>April 10—</i>	oz.	dr.	min.	<i>April 11—</i>	oz.	dr.	min.
11—12 noon	1	5	30	11—12 noon	1	5	5
12—1 P.M.	1	5	20	12—1.30 P.M.	2	4	30
1—2	1	5	25	1.20—2	1	1	5
2—3	1	4	15	2—3	1	4	0
3—4	1	5	30	3—4	1	7	10
4—5	1	3	0	4—5	2	0	0
5—6	1	3	10	5—6	2	0	0
6—7		7	0	6—7	1	6	0
7—8	1	0	0	7—8	1	4	0
8—9	1	1	0	8—9	1	5	10
9—10	1	2	0	9—10	1	3	10
10—11	1	0	35	10—11	1	2	0
11—12	1	1	10	11—12	1	5	20
Midnt.12—1	1	4	0	Midnt.12—1		6	45
<i>April 11—</i>				<i>April 12—</i>			
1—2	1	2	0	1—2 A.M.	1	2	15
2—3	1	1	30	2—3	7		0
3—4	1	2	0	3—4	1	4	55
4—5	1	0	20	4—5	1	4	45
5—6	1	1	15	5—6	2	0	35
6—7		6	0	6—7	1	5	10
7—8	1	0	0	7—8	2	0	0
8—9	1	3	30	8—9	2	1	30
9—10	1	4	0	9—10	1	6	0
10—11	1	3	25	10—11	1	6	0
	30	7	55		39	4	25

Bile Flow for 24 Hours,
without Iridin.

Flow hourly before.

April 13—			April 16—		
	oz.	dr. min.	oz.	dr.	min.
10—11 A.M.	2	0	0		
11—12	2	0	0		
Noon	2	1	15		
1—2	2	0	0		
2—3	1	6	0		
3—4	2	2	0		
4—5	2	0	0		
5—6	1	6	0		
6—7	1	5	0		
7—8	1	0	50		
8—9	1	4	0		
9—10	1	4	0		
April 15—			20	7	30
	oz.	dr. min.			
10—11	6	35	1	15	
11—12	6	45	1	2	0
April 14—			April 16—		
	oz.	dr. min.	oz.	dr.	min.
12—1 A.M.	3	0	6	30	
1—2	1	3	5	2	35
2—3	1	2	0	6	0
3—4	5	0	6	0	
4—5	1	0	35	1	15
5—6	6	15	1	6	35
6—7	1	3	0	1	7
7—8	1	1	10	1	4
8—9	2	1	0	1	2
9—10 A.M.	1	4	0	1	0
Total	...	34	7	30	12 6 55
					12 6 55
					33 6 25

* 10 A.M., iridin, gr. iv.

CHAPTER III.

PATHOLOGICAL CONSIDERATIONS.

ALTHOUGH the gall-bladder and the bile duets are liable to be the seat of benign and malignant growths, their organic diseases are nearly all dependent directly or indirectly on gall-stones.

They are, however, liable to functional disturbance in the shape of catarrh, and in all probability many of the cases supposed to be cholelithiasis, but which are cured by dictetic and medical treatment, are of this nature. Very probably catarrh of the gall-bladder and its ducts is the beginning of many cases of cholelithiasis: a piece of mucus or a mass of epithelium forming the nucleus around which cholesterolin and other bile solids are deposited.

According to Böllinger, the frequency of gall-stone disease varies very much in different localities. Thus in Munich the percentage of cases found post-mortem is 5·4, in Dresden 7, in Basle 8·8, while in Strasburg it amounts to 12·3. Taking the statistics of all cases found in Munich, Dresden, and Basle, the relative frequency of the disease in women as

eompared with men is as five to two. As to the cause of this difference, Böllinger doubts the action of pregnaney, but believes more in the method of life and the manner of elothing. In support of the latter is to be noted the frequent association of gall-stones with eonstricted liver from tight-laeing; thus in 111 women with gall-stones, 37 had at the same time eonstricted liver. As young woimen under thirty suffer from the disease four times more frequently than men of the same age, the author eonsiders tight-laeing of more eonsequenee than pregnaney.

The influenee of age, as shown from over 5,000 post-mortem examinations, points to the frequeney of the disease in advaneing years. Thus, there were 2·7 per eent. in those from fifteen to thirty, 5·9 per eent. in those from thirty to sixty, and 15·2 per eent. in those over sixty years of age. Among eonstitutional influenees, those whieh tend to diminish the force of the eirculation, *e.g.* heart affeetions and old age, are among the most important. On aeeount of the feebleness of the eirculation there is diminished seeretion from the bile passages, and, as a eonsequenee, stagnation and inspissation of the bile.

It is worth noting that gall-stones are very rare in domesticated animals, but amongst cattle they are at times found in the bile ducts within the liver, being caused through chronic inflammation set up by the liver fluke.

Gall-stones are apparently formed if the bile contain in excess the ingredients that compose them; namely, cholesterin and bilirubin chalk, which are very insoluble. The cause of their increase in the bile is disputed, one view being that the excretion of these solids is too great; cholesterin, because of anomalous metabolism, chalk, because of its excess in the food; the other view being that the bile has lost its power of keeping them in solution. Cholesterin exists as such, not only in the bile, but also in the blood; in the bile it forms usually about 2 per cent. of the solid ingredients, this proportion being, according to some authorities, fairly constant, apparently independent of diet or even of disease, and also of the amount present in the blood, which at times contains more than the bile can hold. There appears, however, to be an increase of cholesterin where there is catarrh of the bile ducts. Chalk is apparently secreted by the mucous membrane. Gall-stones appear to be frequently started by a morbid condition of the

epithelium of the bile ducts, and at first in such cases are usually soft, having a central cavity filled with a grumous liquid. The bilirubin chalk and cholesterin are deposited later, forming a shell, like an egg-shell, after which the interior consolidates. The contained fluid is sometimes as clear as water. The cholesterin is partly deposited outside all, partly penetrates within, the consolidation being always a secondary process. Carbonate of lime may be deposited, in which case a stony hardness will result.

The mucous membrane of the bile ducts in cholelithiasis is always diseased, according to Meckel, who calls it "lithiatic catarrh," but a better term would be "desquamating angio-cholitis."

The stasis may also favour infection; a bacillus resembling the bacterium coli commune being very often found, and these bacilli may permeate the whole stone.

We must state that it is held by Naunyn, that chemical alterations, as mentioned by Thudichum, which are supposed to lead to the precipitation of certain substances in the bile, have not been substantiated: and that it is untenable to look for the formation of gall-stones in decomposition of the bile.

The frequency of the occurrence of gall-stones can only be safely based upon post-mortem examination; and according to Naunyn every tenth adult suffers from them, the percentage found after death varying from 5 to 12, according to different competent observers, the differences in observation being probably due to the fact that gall-stones are easily overlooked.

From all statistics three very important deductions can be made: (1) Gall-stones are four and a half times more frequent in women than in men. (2) Before thirty they are infrequent (2 to 3 per cent., Schröder); after that age they become much more frequent: 10 per cent. In old age their frequency becomes strikingly increased—25 per cent. over sixty years of age. (3) Women that have borne children are most frequently affected of all. Thus Schröder found that among women with gall-stones 90 per cent. had borne children. From these facts Naunyn concludes that the most distinct cause is the stagnation of the bile in its passages. In women this is favoured by their mode of clothing, and possibly by pregnancy: both of which retard those movements of the diaphragm that assist in the expulsion of the bile. The frequency of gall-stones in old age

is due to retardation of the bile flow, through atrophy of the small muscles in the walls of the bile passages (Charcot). The stagnation produces disease of the mucous membranes of the passages, and the cholesterin and bilirubin chalk are deposited in consequence of destruction of the epithelium. At first an amorphous deposit is formed, which by absorption of the fluid becomes granular. These granules increase by deposition of bilirubin chalk and an infiltration of cholesterin. The latter, supplanting the bilirubin chalk, forms ultimately the pure white cholesterin calculus. A further secondary formation occurs in the deposition of carbonate of lime; of importance, because the stone is then no longer soluble. The cause of the stone-forming-desquamative-angiocholitis is the retarded discharge of the bile, through which an injection of the bile passage is favoured. It is also possible that bacillus growth in the bile favours the formation of gall-stones. Probably it is in this manner that the intra-hepatic stones are formed (Naunyn).

As to the conditions determining the formation of gall-stones, it is evident, from the authorities quoted above, that there is a very considerable divergence of opinion. But this at

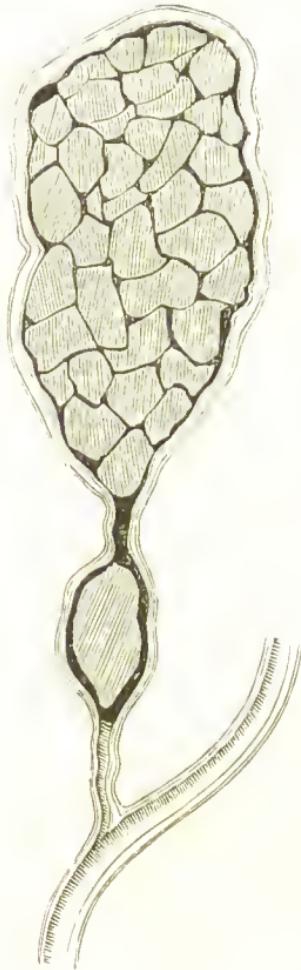
least may be said, that with an impeded flow of bile, and a diseased or disordered mucous lining in the gall-bladder and ducts, there is a powerful predisposition to their formation. The rest is speculative and a subject for further investigation, and stands thus:—

If the bile and blood be surcharged with cholesterol and bilirubin chalk, then the chain of causation appears fairly complete; if not, a stagnation of the bile and a disordered mucous membrane would seem to be, not alone the predisposing, but the determining causes of gall-stone formation.

Gall-stones may vary in size from a No. 12 shot-corn up to the magnitude of a hen's egg. The large concretions are said by Mr. Lawson Tait to be usually single; and I believe that this is often the case; but it is not always so, as I have on several occasions removed a large gall-stone with a number of smaller ones, and in other cases have removed several large stones together.

Figs. 11 to 14 show the exact size and shape of some of the concretions which I have removed by cholecystotomy, and Fig. 7 shows how they were packed in Case 7.

I have at times found, on operating, only one



McG. Young.

Fig. 7.—Diagram showing how Concretions may be packed.

concretion, and have on several occasions removed sixty or seventy, or more. In a case I saw with Dr. Turner, 270 were found.

Their colour may vary from white to dark brown, or even nearly black, but the usual colour is a dirty brown. If single, the gall-stone is oval or rounded, often mammilated. If more than one be present, they are faceted.

In consistency, which is a very important matter when crushing comes to be considered, they vary greatly, some being easily crushed between the finger and thumb, whilst others are so hard as to be incapable of being crushed, even with forceps, without danger to the ducts. Fig. 11 c shows a section of a gall-stone, and illustrates the stratification.

Gall-stones act mechanically by causing obstruction in the ducts: if in the cystic duct, by retarding the outflow of the mucus from the gall-bladder; if in the common duct, by preventing the bile from entering the bowel.

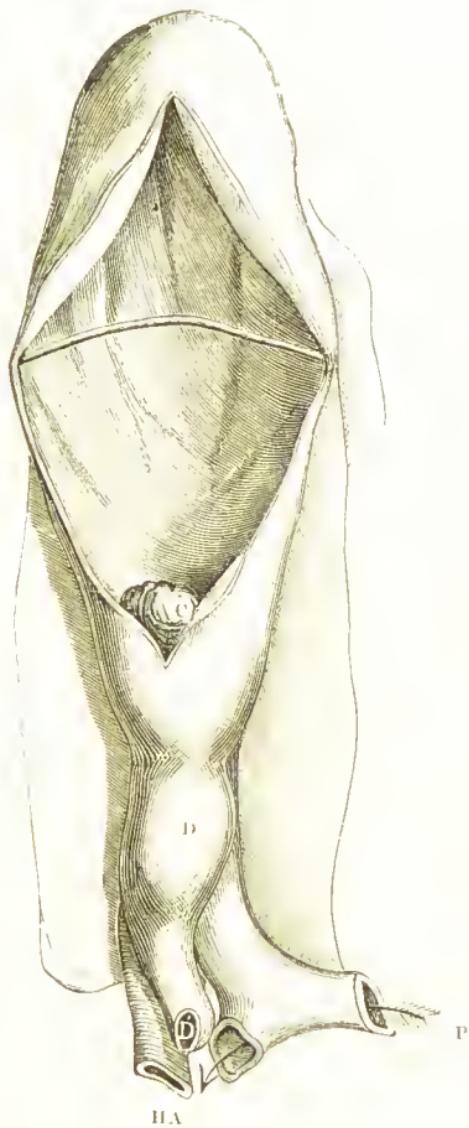
The accompanying illustrations (Figs. 7, 8, 9) are good examples of impaction of gall-stones in the ducts. If the concretions be numerous and small, they may produce sudden and violent attacks of pain in the epigastrium—so-called “spasms”—from time to time as they pass, the

attacks being of short duration, and followed occasionally by slight jaundice; or if the gall-stones be very small they may only give rise to pain as they pass through the smaller cystic duct, traversing the larger common duct easily, producing no obstruction, and therefore no jaundice (as in Case 11), in which instance as many as six concretions passed at one time, and were subsequently discovered in the motions.

In these cases no tumour can as a rule be felt, although frequently the patient will complain of a feeling of fulness, and during the attack will feel a swelling, which I think may be probably caused by the contraction of the gall-bladder in forcing out its contents.

If the gall-stone be very large it may be prevented from entering the duct, and so may not give rise to any acute attack, although its presence will usually be indicated by the constant feeling of weight and uneasiness, with at times more or less pain under the right costal margin, or in the epigastrium.

When the stones are of medium size, that is, between the size of a large pea and a cherry, they may enter the duct, produce an attack of "spasms," and then fall back into the gall-bladder, subsequent examination of the faeces



J. W. Haigh.

Fig. 8.—Gall-bladder, seen from below. (*From a specimen in the Museum of the Leeds Medical School.*)

c, Calculus blocking duct; n, site of second calculus in duct; p, branch of portal vein; ha, hepatic artery; n', common duct.

being negative so far as gall-stones are concerned ; or they may pass on into the cystic duct completely blocking it, and the gall-bladder secretion accumulating may form a tumour (Cases 1, 2, 5, 6, etc.). The swelling may continue to increase in size till it becomes so large as to form a considerable abdominal tumour, which has been mistaken for an ovarian tumour on more than one occasion. In this condition of distension, the gall-bladder becomes much thinned, and may rupture, giving rise to acute peritonitis. Gall-stones may ulcerate through the duct, and, bursting into the peritoneum, may in this way produce death by perforative peritonitis.

Not infrequently impacted gall-stones lead to adhesive peritonitis ; and when ulceration occurs, the concretion may pass into the large or small intestine, or even into the stomach ; and I suspect that in some of the reported cases where gall-stones have been vomited this is the explanation, although reversed peristalsis may occasionally account for the unusual occurrence.

If ulceration occur, septicaemia or pyæmia may ensue.

Not infrequently the distended gall-bladder inflames, and the fluid becoming purulent, forms

an empyema of the gall-bladder (Case 3), when, unless evacuation of the abscess be effected, it may discharge in several directions; if into the liver, as in Cases 4 and 22, an abscess of the liver results; if into the adherent hollow viscera, the pus may perhaps discharge safely; if into the peritoneum, purulent peritonitis will ensue; if into the parietes, as in a case under the care of my late and lamented colleague, Mr. McGill, a superficial abscess may form, which when opened may give exit not only to pus but to gall-stones; but the pus usually selects such a tortuous passage that partial relief is only given, and death from exhaustion is not unlikely to occur.

Generally there are peritoneal adhesions, for which reason the gall-stones burst into the duodenum, or more seldom into the stomach or colon, leaving a fistula. The discharge of the gall-stones may occur in different directions —e.g. over the symphysis pubis or into the pelvis of the kidney. The most usual place is in the neighbourhood of the umbilicus, the stone passing readily along the suspensory ligament. Böllinger cites the following cases:—

1. Woman, seventy-two years of age, in 1886 had an increasing swelling of the abdomen.



Fig. 9.—Showing Impaction of Gall-stones in the Common Bile Duct. (From the Edinburgh Medical Journal, October, 1889, illustrating a paper by Mr. Lawson Tait.)

a, Skin with biliary fistula, e; b, gall-bladder; f, distended entrance of hepatic duct; g, large gall-stones occupying common duct; h, post-mortem opening into common duct to exhibit another group of gall-stones *in situ*; d, cut edge of duodenum.

which formed an abscess, and burst in the summer of that year, leaving a fistula. From 1887 to 1889 the patient suffered from attacks of a peculiar nature—rise of temperature, palpitation, and eructations from the stomach. In the internals the patient was quite well. In 1889 there was discharged from the fistula 50 to 100 grammes daily of a yellow or brown-red, sometimes bile-coloured, fluid. During the flow of this fluid the patient's condition was good and the stools normal. In June, 1890, a large oval stone was discharged from the fistula, after which the sinus closed. The stone weighed 20 grammes, was 6 cm. long, 2·5 cm. thick, and 7·5 cm. in circumference.

2. The author quotes another case where an abscess formed in the abdomen below the liver and burst, discharging pus and bile and numerous gall-stones. After discharging them for six months, a worm (*Ascaris lumbricoides*) eight inches long was discharged through the fistula, after which the sinus healed up. The patient's general condition was good during the whole time.

In nearly all cases where there have been repeated attacks of cholelithiasis I have found adhesions of the gall-bladder to the neighbouring

viscera, liver, colon, and duodenum, and to the parietes, proving, therefore, that the attacks are frequently accompanied by peritonitis; and I believe that in many cases these adhesions alone give rise to symptoms closely simulating chole-lithiasis; moreover, a careful separation of the adhesions is frequently productive of good. Thus a beneficial effect may be produced by an operation which appears at first to have been unnecessarily undertaken: that is, if gall-stones should not be discovered. Sometimes the presence of a gall-stone produces such an alteration in the gall-bladder that the walls gradually contracting around it completely obliterate its cavity, so that bile can no longer enter and the gall-stone ceases to increase in size. One would think that in such a case the patient would be cured by nature's process, and possibly this is so in some instances; but I have on several occasions operated, and found this condition producing all the symptoms which would occur from the passage of a gall-stone, and in such cases there have been numerous adhesions, which might account for the persistence of the symptoms.

As proved by post-mortem examination, calculi may be present in the gall-bladder and

producee no trouble, but when this is the case the ducts will usually be found to be clear and the gall-bladder free from adhesions.

Should the gall-stone or stones sueceed in reaehing the common duct, and there becomie impacted, jaundiee at once sets in, and if the obstruction be complete, intense cholæmia rapidly ensues; the gall-bladder beeomes distended, the liver enlarges, and serious toxic symptoms sooner or later supervene. These are the cases in which difficulty in diagnosis oceurs. This will be dwelt on more fully in the chapter on Diagnosis (chap. iv.). The following deseriptiion and illustration (Fig. 10) of the largest gall-stone that has, so far as I know, been described, are taken from Mr. Hutehinson's *Archives of Surgery* for July, 1891, the original source being Dr. Spen's translation of Dr. Aug. G. Richter's work, entitled "Medical and Surgieal Observations," published in 1793:—

Enormous Gall-stone removed (after death).—Concerning this case Richter writes: "There was a stone in the *ductus choledochus* whieh, on account of its uncommon size, I have caused to be engraved in the annexed figure. It weighed three ounces five drams. All round the stone was fluid bile, so that this fluid had evidently

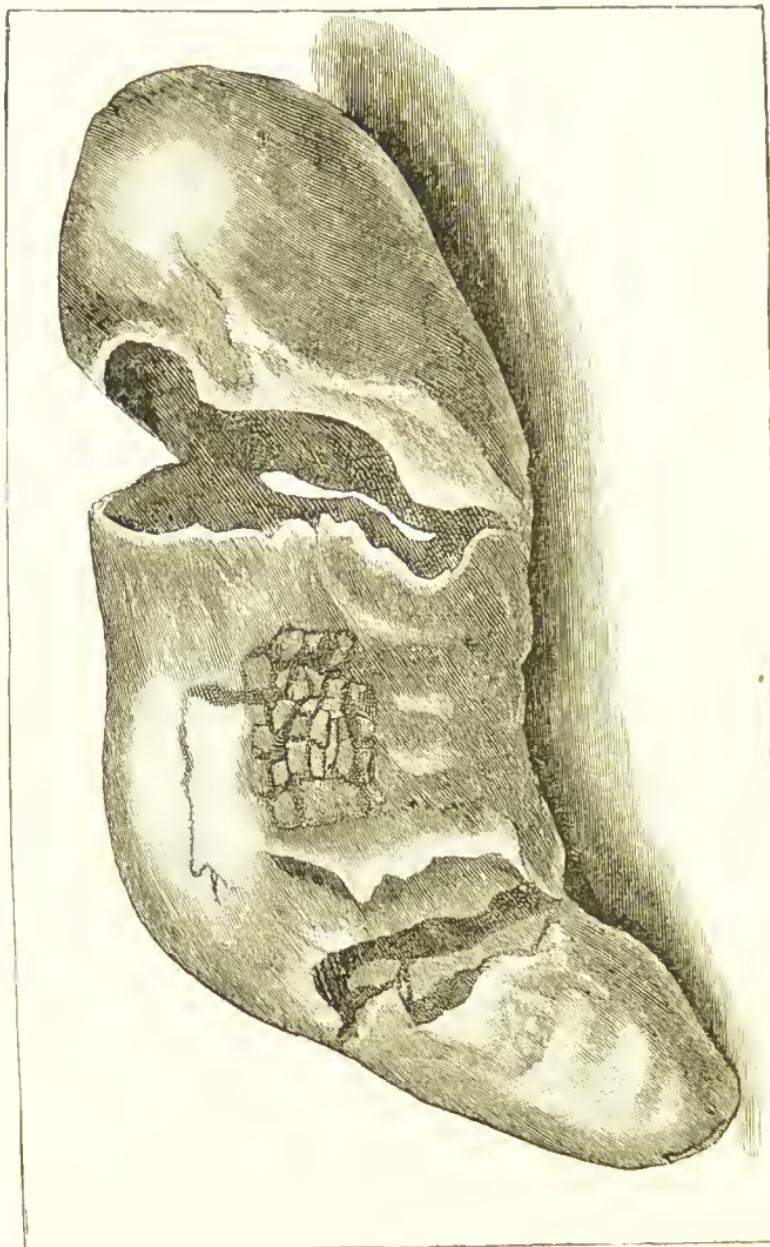


Fig. 10.—Largest gall-stone ever described. (From Hutchinson's "Clinical Illustrations.")

passed by the stone into the duodenum. It fell into three pieces on being taken out. The external surfaces resembled a very firm extract of liquorice. On some places there were evident marks of other stones adhering to it. The thick end of the stone was in the duodenum, the most pointed was turned towards the neck of the gall-bladder." The subject of the case was a man of forty, who died in the hospital at Goettingen in March, 1792. He had had jaundice for four years, and had been liable to colic, etc., much longer. His jaundice had increased of late, and he had had pains and feverishness. His whole body was of a dark yellow colour, and in some places even of a dark brown. His stools were white, and his urine contained bile. Before death, bile returned in his stools. He had rigors and fever, with *transitory blindness and vertigo*. During the last week he was always sleepy and often insensible. There was some vomiting. His abdomen was distended and his feet were swollen. After two or three days of insensibility, he had delirium and convulsions just before death. The liver was adherent to the parietes, etc. The gall-bladder was five inches long and two broad. It was full of dark bile, and contained thirty gall-stones. From

the substance of the liver “dark brown bile issued as from a sponge.”

“ We have in this narrative an excellent illustration of the symptoms produced and the sufferings entailed by the long-continued impaction of a calculus in the ductus communis. Four years’ jaundice, the skin almost black, attacks of colic, and finally death with brain symptoms: such is the picture, and it is probably a typical one. The case is worth remembering were it but to excite our grateful appreciation of the advances of modern surgery. Nothing but an operation could have saved the man, and in all probability that would have done so.”

Physiologists are familiar with the fact that if the urine from a case of jaundice be submitted to the ordinary tests for albumen, a precipitate will often occur which might be mistaken by an unskilled observer for one due to albumen.

Professor Grocco (*Brit. Med. Journ., Suppl.*, 1891) calls attention to this fact, which is usually entirely omitted from the text-books, though it might easily mislead an unskilled observer. The following is a brief summary of his remarks:—(1) Certain icteric urines give,

with the ordinary tests for albumen, precipitates which resemble in many respects those due to albumen, even although this latter may be entirely absent; (2) such a urine may give, on warming and adding nitric acid or acetic acid, a flocculent precipitate, clearly organic in character, which disappears on adding excess of acid or of potash; (3) the precipitate may be produced by acetic acid even in the cold, or at a temperature far short of that required to cause precipitation of albumen; (4) very small quantities of mineral acids will also produce the precipitate; (5) the precipitate is soluble in alcohol, but not in chloroform or ether, neither does it yield the biuret reaction; (6) it is not composed either of nucleo-albumen, uric acid, or urates, and it occurs also in patients who are not under treatment by balsamic medicines; (7) the precipitate is said by Grocco to be composed of bile pigments, especially of biliverdin. [In this, however, he must be mistaken, as he states that it is not soluble in chloroform or ether, biliverdin being soluble, at any rate, in the former (Vögel). His statement that the precipitate is obtained in urines quite out of relation to their degree of pigmentation would also negative the view that the precipitate consisted of bile pigment. It is

practically certain that such appearances are due to the precipitation of bile acids.] (8) When the above results are obtained, the author is inclined to think that the disease is grave—probably biliary calculus, acute yellow atrophy, carcinoma of the liver, or cirrhosis; (9) To test for the presence of albumen under these conditions, it will be best to treat the urine with $\frac{1}{50}$ th or $\frac{1}{60}$ th of its volume of strong acetic acid, leaving it in a cold place for some hours, then to filter off the precipitate which has formed, and to test the filtrate in the ordinary manner. It would be well first to make quite certain, by the addition of a little more acid, whether precipitation of the bile acids was complete before applying further tests.

CHAPTER IV.

SYMPTOMS AND DIAGNOSIS.

SINCE it would lead to much reiteration to give separate chapters on symptoms and diagnosis, they are considered together.

The ordinary symptoms of cholelithiasis are characterised by paroxysmal attacks of pain, which, occurring at irregular intervals, often without apparent cause, start in the right hypochondrium or in the epigastrium, and radiate thence over the abdomen and through to the right scapula. The attacks are often accompanied by sickness or vomiting, and if severe, by collapse. They are sometimes followed by jaundice, with its well-known symptoms, but this is frequently absent. A feeling of fulness in the right hypochondrium at times accompanies the attack, but the formation of a tumour does not as a rule occur, except where the ducts become blocked.

Accompanying the special symptoms will usually be found marked depression of spirits, want of appetite, dyspepsia, and loss of weight.

According to Naunyn, there should be

distinguished a regular and an irregular form of the disease. The former occurs where there is simply lodgment of the calculi in the gall-bladder or passage of the stones along the ducts ; the latter is seen when there is infectious angiocholitis, with abscess in the liver, fistula, and other complications.

It will be more convenient to consider the symptoms in detail.

(a) *Paroxysmal Pain*.—For the most part, the patient complains of pain under the right costal margin or in the epigastrium, the pain radiating thence over the abdomen and to the right scapula ; but in one of my cases the pain radiated to the left shoulder. These attacks come on suddenly, when the patient is apparently quite well, and usually end by causing sickness or an attack of vomiting. The vomiting leads to relaxation of the duct, and if the gall-stone be small it may pass on, and thus end the seizure. The attacks come on without apparent cause, although at times they may appear to be caused by exertion or by taking food.

It will be easily understood, however, that supposing the gall-bladder to be crowded with calculi, as in one of my cases, where sixty-six gall-stones were removed, and that if the patient

have to undergo as many or even more attacks, it becomes a very serious ordeal ; for although several calculi may pass during one seizure, yet one gall-stone may produce several attacks before passing. Not infrequently after an attack has passed off, a dull aching is felt for some time or until another seizure. The acute agonising pain may of itself cause death, as in the case of a lady whom I saw with my friend, Dr. Drake, gall-stones being diagnosed. The next attack of pain unfortunately proved fatal, and at the autopsy a gall-stone was found half extruded into the duodenum.

Not only may the agonising pain of one attack prove fatal, but repeated attacks of pain occurring one after the other, without time between to fully recover, may produce very serious illness, or even death by exhaustion. The agonising pain may unhinge the mental equilibrium, and in one case under my care an attack of acute mania followed a seizure.

Strange as it may seem, it is not uncommon to find in the post-mortem room gall-stones, single or numerous, in the gall-bladder of persons who have never complained of pain ; but it is worth noticing that in most of these cases there are no adhesions.

But more than this, there can be no doubt that even a large gall-stone may ulcerate its way into the bowel, and produce symptoms of intestinal obstruction, with few or no signs to indicate that such serious organic mischief has been going on. It follows, therefore, that in considering cases of intestinal obstruction, gall-stones cannot be excluded, although there has been no history of cholelithiasis.

It is just possible, that as some persons are capable of passing urinary calculi with few or no symptoms, so others may have the power of passing small biliary calculi: but this has yet to be proved, and in the meantime, it is difficult to explain why in some persons gall-stones should produce such serious trouble, and in others no symptoms at all.

(b) *Vomiting* is as a rule paroxysmal, but sometimes almost continuous. On November 5, 1890, I operated at Sunderland on a patient of Dr. Squance's, where the attacks had been so severe, and the patient was so weak from persistent vomiting, that I feared she could scarcely bear the operation I had gone to perform. However, I operated and fortunately she made a good recovery.

The vomiting first consists of the stomach

contents, but if severe, and the common duct be not blocked, bile is vomited, and I have known in persistent emesis the vomit to become stercoreaceous. A gall-stone may be vomited, it having entered the stomach either by reversed peristalsis or by ulceration ; however, this occurs but rarely.

(c) *Collapse*, if the pain be severe. Besides the case referred to previously, where the collapse absolutely produced a fatal termination, I have on several occasions seen patients so profoundly collapsed by attacks of cholelithiasis as to lead to a difficulty in diagnosis, the case being more like one of perforation of some abdominal viscus or some intra-abdominal haemorrhage ; but the history of previous attacks, and of the commencement of the attack in question, will usually help one to arrive at a correct diagnosis.

(d) *The formation of a tumour* in the region of the gall-bladder.

The gall-bladder enlarges downward and forward in a line which, drawn from the tenth costal cartilage, crosses the middle line a little below the umbilicus, as pointed out by Mr. Taylor. The enlargement may vary very considerably, from a tumour just perceptible to the touch, situated in the position of the gall-bladder, to

one of such size that it may resemble an ovarian cyst. At times there may be a difficulty in diagnosing the nature of the tumour; and not long since a case was reported in one of the journals where a surgeon thought he was operating on the kidney, and opened the gall-bladder in the loin: so that occasionally a real difficulty in diagnosis does occur.

If the method of distending the colon with air or carbonic acid gas through the rectum, as suggested by Ziemmisen, be adopted, it will be found that if the swelling be kidney, it will be pushed farther into the loin, but if gall-bladder, it will be pushed forwards and upwards. Even this, however, does not always lead to a positive diagnosis, as illustrated by a case of apparently solid tumour situated below the right costal margin, in a lady whom I saw with Dr. Kebbell, of Flaxton. I believed the swelling to be renal, since it could be pushed forward from the loin; but as there was no resonance between it and the liver, and as it had been preceded by attacks of pain somewhat resembling eholelithiasis, there was the possibility of its being gall-bladder.

We therefore applied Ziemmisen's test, when the tumour was displaced upwards, making it appear as if it were gall-bladder. At the

operation I removed a solid tumour firmly fixed to the upper end of the right kidney—so firmly fixed, in fact, that I had to remove the kidney with it, the tumour being probably a sarcoma of the suprarenal capsule.

The reason why the difficulty in diagnosis had arisen, was that the transverse colon passed below the tumour: when, therefore, the colon was distended, the tumour was pushed up into contact with the liver.

As a rule, however, when a tumour is found in the right side of the abdomen, moving with the liver on respiration, with a history of having grown from above downwards, having a smooth rounded outline, with a feeling of fluctuation, dull on percussion, and with its upper margin starting at the notch of the gall-bladder, it will be found to be a distended gall-bladder, and Ziemmsen's test will usually clear up any difficulty in diagnosis.

Distension of the gall-bladder without jaundice indicates either stricture of the cystic duct or impaction of a stone in the duct, and, as in Case 1, may occur without symptoms pointing to gall-stones, although cholelithiasis is essentially the cause of the trouble.

Distension of the gall-bladder accompanied

by jaundice has in all the cases which I have observed, and in three cases where I have operated, turned out to be dependent on cancer, either of the head of the pancreas or of the common duct; and although a blockage of the common duct by gall-stone or in any other way may cause the same signs, my experience in this class of case has made a strong impression on my mind.

(e) *The presence of gall-stones* in the motions after an attack is valuable evidence, but their absence does not negative cholelithiasis, as I have operated on a number of cases, and found gall-stones where none had ever been detected in the motions, although diligently sought for.

The way to search for gall-stones is to let the patient pass the motion into a solution of carbolic acid, to have it stirred well, and then to pass it through a fine sieve with about $\frac{1}{16}$ th inch mesh.

(f) *Jaundice*.—So long as the gall-stones are in the gall-bladder or cystic duct, there is nothing to prevent the bile from passing down the common duct into the intestine; but should the gall-stones be impacted in the common duct, the passage of the bile is obstructed, and jaundice ensues.

These are the most difficult cases in which to decide on operation, for frequently chronic jaundice indicates malignant disease; and not only do patients with cancer bear operation badly, but where jaundice is associated, there is the same tendency to persistent oozing of blood from the wound after operation, as there is to spontaneous haemorrhage where no operative measures have been undertaken: as in a case I saw with Dr. Turner, where a diagnosis of gall-stones was made, but where the patient, though young, died of cerebral haemorrhage before operation had been consented to: a post-mortem examination revealing a large number of gall-stones—about 270—blocking the biliary passage: and, as in Case 8, where, although relief was given by the operation, from the third day oozing of blood occurred from the interior of the gall-bladder and from the suture punctures, so that in the second week, despite transfusion, the patient succumbed, simply from loss of blood.

A very interesting and important paper by Dr. Osler, of Baltimore, on the "Symptoms of Chronic Obstruction of the Common Bile-duct by Gall-stones," appeared in the *Annals of Surgery* for March, 1890, in which he says that the combination of the following symptoms is

characteristic of the existence of gall-stones in the common duet, and is, therefore, valuable in distinguishing between that form of obstruction and malignant tumour:—

1. Jaundice of varying intensity, deepening after each paroxysm, which may persist for months, or even years.
2. Ague-like paroxysms, characterised by chill, sweating, and fever, after which the jaundice usually becomes more intense.
3. At the time of the paroxysm pains in the region of the liver, with epigastric disturbance.

This is fully borne out by my experience, and in two cases of jaundice of about two months' duration, in patients of the respective ages of thirty and thirty-four, where there was this combination of symptoms, I operated, and found gall-stones impacted in the common duet. I succeeded in crushing them and passing the fragments on into the bowel.

By a reference to the cases it will be noticed that the most favourable for operation are those in which either no jaundice has occurred or where it has rapidly passed away.

In an address given before the British Medical Association in 1887, Dr. Ord drew attention to gall-stones producing intermittent

pyrexia, stating that his attention had been first called to this symptom by some remarks of the late Dr. Murchison having reference to the ease of a distinguished medical officer, who, after his return to England, was attacked with paroxysms of shivering, followed by fever and sweating, at regular weekly intervals. He was supposed at first to have a recurrence of an old intermittent fever, later to have hepatic abscess, till at last his symptoms indicated and the necropsy proved that his actual and only disease was a gall-stone so impacted as to produce great irritation, but not complete obstruction of the common duct.

Similar cases have been noticed by Dr. Charcot (*Maladies du Foie*, 1877), who argues that the fever is due to the absorption of some matters morbi into the blood. Dr. Murchison was of opinion that such attacks were not of a poisonous or septic origin, but were due to nervous irritation.

From the cases I have seen, I should think that both explanations are correct, the fever not being unlike that known as "urethral," in which there is also a contention as to whether it is due to septic absorption or to nervous irritation.

Dr. Ord, in the paper previously referred to,

considers that gall-stones may, by a reflex effect, produce hyperæmia of the liver, leading to glycosuria ; and he refers to cases where there certainly seemed to be some connection between the two diseases. He also believes that reflected visceral inflammations, especially pneumonia, may occur from gall-stone attacks, and I have myself seen pneumonia of the right side associated with cholelithiasis.

Dr. Murchison pointed out the association of renal troubles with biliary colic, which have their probable explanation in a reflex act.

The frequent association of gall-stones with malignant disease would seem to point to something more than a mere coincidence ; and I know that my colleague, Dr. Churton, as well as several other physicians with whom I have been associated in these cases, holds strong views as to gall-stones being a frequent precursor, if not the actual cause, of malignant disease.

Case 9, where there was a clear history of cholelithiasis of several years' duration, and where ultimately cancer of the duct was found, would seem to be an illustration in point.

This is a difficult matter on which to speak positively, as malignant disease may itself produce such an alteration in the bile as to lead

to the deposition of cholesterin and other biliary solids, and thus in some cases, instead of cancer being caused by gall-stones, it may actually be the cause of cholelithiasis.

Zenker found gall-stones in 85 per cent. of the cases of cancer of the gall-bladder. The fact, however, that women suffer from cancer of the gall-bladder more frequently than men (80 : 20) is in favour of gall-stones being the original disease. The two following cases, cited by Böllinger, go to prove that gall-stones were present before the development of carcinoma.

1. Woman seventy-three years of age, who had never suffered from gall-stone colic, suffered from severe jaundice and died after five months' illness. There was found in the post-mortem examination carcinoma of the gall-bladder occluding the cystic duct, and extending to the sharp edge of the liver and the transverse colon. In the gall-bladder was a gall-stone the size of a pigeon's egg. There was also secondary carcinoma in the portal, epigastric, and retro-peritoneal lymph glands.

2. Woman forty-seven years of age, with five months' history of illness, died with the symptoms of cancer of the gall-bladder, with extensive secondary deposits in the neighbourhood

and in other organs. The gall-duct was occluded by the cancer, and the gall-bladder was full of gall-stones.

The cancer in these cases was probably due to the irritation caused by the stones, in the same manner as mechanical irritation produces cancer of the lips.

The *diagnosis* chiefly rests on paroxysmal attacks of pain, starting in the right hypochondrium, and radiating thence over the abdomen and through to the right scapula: the attacks being often accompanied by vomiting or collapse, and sometimes followed by jaundice, although jaundice is frequently absent. If persistent, the presence of malignant disease may be suspected. If the jaundice, however, be dependent on gall-stones, there will, in all probability, be the train of symptoms so well described by Dr. Osler, and mentioned on a previous page. If tumour be present, the enlargement usually progresses in a diagonal line from the ninth or tenth costal cartilage downwards and forwards to a point midway between the umbilicus and pubes. The tumour is usually dull on percussion, but resonance may frequently be elicited by percussion between it and the liver. On account of the tension, fluctuation can seldom be felt except

the tumour be large; palpation reveals the fact that the tumour moves upwards and downwards with the liver during forced inspiration and expiration. The abdominal swellings which I have known to be mistaken for enlarged gall-bladder are movable right kidney, solid or cystic growth of the kidney, eaneer of the pylorus, eaneer of the liver, sareoma of the right suprarenal capsule, malignant tumour of the omentum, hydatid tumour of the liver, hydatid of the peritoneum, a seybalous mass in the colon, and tumour in the abdominal walls: but most of these present such marked signs of their own that it is unnecessary to consider their differential diagnosis. Ziemmsen's test, previously mentioned, usually clears up the difficulty in diagnosis between gall-bladder and renal enlargements, and an exploring syringe will reveal the nature of a hydatid cyst. In cases where a clear diagnosis cannot be arrived at, it is probably much safer to make a small exploratory incision than to trust to aspiration or acupuncture.

Sounding the gall-bladder for diagnostic purposes, either by means of a probe passed through a canula or by the fine needle of an aspirator, has been practised successfully on several

occasions : in the first instance by Bartelow in 1876, afterwards by Whittaker in 1882, and by Dr. Harley in 1884. Not only is the method very uncertain, but, as has been proved by experience, the operation, though apparently simple, is not by any means free from risk, Dr. Keen having had peritonitis follow the procedure, and Dr. Harley having reported a fatal result. Seeing, then, that this method of diagnosis is uncertain, and attended with danger, it seems to me that it may safely be relegated to oblivion, and be replaced in cases of doubt by a small exploratory incision sufficient to admit the finger, when, if further treatment is called for, it can be at once adopted.

Aspiration is also liable to be followed by peritonitis, and cases have been reported where death rapidly followed the simple emptying of the gall-bladder by an aspirator. If, however, the aspirator be employed, it is safer to use a small needle, and to remove as much of the fluid contents of the cyst as possible, in order that intra-cystic tension may not lead to an effusion of fluid into the peritoneum through the puncture left by the needle.

Lead colic, flatulent dyspepsia, gastric ulcer, renal colic, intestinal obstruction, membranous

enteritis, ague, abscess of the liver, cancer of the biliary ducts or of the pancreas, may produce symptoms akin to cholelithiasis.

The blue line on the gums in lead poisoning, the more or less persistent colic, the constipation, and the result of treatment, as a rule, soon clear up the diagnosis. Where the stomach is at fault, the pain is usually after food, and is referred to the left side and through to the left scapula; whereas in biliary colic it is usually in the right side and referred to the right shoulder, and it is as a rule unassociated with food.

In right renal colic the pain passes downwards, and is associated with bladder irritation and an altered condition of the urine.

The regular attacks in ague and the absence of symptoms referred to the gall-bladder will usually serve to distinguish between the two. The presence of persistent jaundice is suspicious of cancer of the ducts or of the head of the pancreas, especially when there is an absence of the characteristic spasms and of the ague-like paroxysms which are usually found in jaundice due to gall-stones. The existence of hard nodules in the liver and the history of great loss of flesh and strength point in the same direction;

but in many cases the diagnosis can only be cleared up by exploratory incision.

Intestinal obstruction may be one of the earliest symptoms of gall-stones, as the following synopsis of a case which came under my care in the Leeds General Infirmary will prove.

CASE 1.—*Acute Intestinal Obstruction—Laparotomy—Volvulus of Small Intestine—Volvulus Reduced—Relief of Obstruction—Passage of large Gall-stone—Cure.*

Mrs. H—E—, æt. 68. Previously well.

Date.	Day of Illness.	Details.
Nov. 4 '90	1	Sudden abdominal pain and vomiting.
„ 8	4	Vomit stercoraceous.
„ 12	8	All symptoms of acute obstruction. Laparotomy. Volvulus of small intestine found and reduced.
„ 13	9	Patient completely relieved. Flatus passed. No vomiting.
„ 20	16	Bowels moved by enema. Large gall-stone passed with considerable pain.
30	26	Returned home convalescent.

For copy of photograph of the gall-stone passed, see Fig. 11, *a.*

The following cases taken from the Clinical Society's *Transactions*, vols. vi. and xii., and

from the *Edinburgh Medical and Surgical Journal*, vol. xx., 1824, and epitomised in Mr. Jonathan Hutchinson's *Archives of Surgery*, serve as excellent illustrations of the same condition, the onset being acute, and without preliminary symptoms to indicate the cause.

CASE 2.—*A Gall-stone Case—Acute symptoms supposed to be those of Obstruction by a Band—Laparotomy—Removal of the Calculus—Death.* (*Clinical Society's Transactions*, vol. xii. p. 106.)

Mrs. R—, æt. 50. Never any illness whatever before.

Date.	Day of Illness.	Details.
Aug. 5	1	Woke in the night with sickness and severe abdominal pain. Vomiting and pain.
„ 6	2	Vomiting and pain; opium given, but rejected.
„ 7	3	„ „ „
„ 8	4	Seen in the evening by Mr. Bryant. In great pain; much faecal vomiting; abdomen distended, tender, and tympanitic. No peristalsis. Centre of pain to left of navel.

At this date the patient was removed to Guy's Hospital for operation. A gall-stone was excised from bowel: gut closed by catgut suture. Intestine above punctured at two or three places

to give exit to flatus and fluid faeces. Death eight hours after the operation. Acute peritonitis; no faecal extravasation. The gall-stone had travelled to within a foot of the caecum. The stone had a circumference of $3\frac{1}{4}$ inches. (See Fig. 13, *a*.) The stone had probably passed by ulceration from gall-bladder to duodenum. It was a long oval, and weighed 238 grains.

The diagnosis made before the operation was that of "acute intestinal obstruction, which was supposed to be due either to a band, twist, or internal hernia."

(For illustration of calculus removed, see Fig. 13, *a*.)

CASE 3.—Case in which a large Gall-stone was passed after twelve days' obstruction—Recovery. (Clinical Society's Transactions, vol. vi. p. 194. Dr. J. S. Gray's case.)

Date.	Day of Illness.	Details.
Dec. 14	1	A man aged 40 was seized with nausea, pain, and vomiting. Pain paroxysmal and referred to navel.
,, 15	2	Seen by Dr. J. S. Gray, the narrator. Pain very violent, vomiting distressing, and matters ejected very offensive.
,, 16	3	Less pain, and all the symptoms better; but no action of bowels. He got up and went out.
,, 17	4	Much worse in all respects; vomit sanguineous; countenance haggard; desponding as to the result; an enema brought away faeces. This was the last motion until 24th.
,, 18	5	The sickness still urgent. Probably the enema had only cleared the bowel below the obstruction.

Date.	Day of Illness.	Details.
Dec. 19	6	Fed by enemata; vomiting and constipation.
,, 20	7	The same.
,, 21	8	The same.
,, 22	9	The same, but less urgent.
,, 23	10	The same.
,, 24	11	The bowels acted spontaneously and freely. The vomiting ceased, and in the course of the evening a large gall-stone escaped.

The stone weighed an ounce and thirteen grains, and its smallest circumference was more than two inches.

CASE 4.—*A nine days' attack of severe abdominal obstruction in an old woman, safely terminated by the escape of a very large gall-stone.* (From the *Edinburgh Medical and Surgical Journal*, vol. xxii., 1824. Dr. David Craigie.)

Date.	Day of Illness.	Details.
1823. Mar. 28	1	A healthy old woman walked from Leith to Edinburgh, and in the evening was sick, and had pain over the whole abdomen.
,, 29	2	Worse in all respects. No action of bowels; careful search for hernia, but none found. No jaundice.

Date.	Day of Illness.	Details.
Mar. 30	3	She was bled, and had enemata and purgatives. All the symptoms continued. No jaundiee.
„ 31	4	Incessant vomiting: obstinate constipation, pain, occasional hiccup. Whole abdomen tender. Tongue dark brown and very dry. Face and extremities inclined to be cold. Warm bath and bleeding afterwards.
April 1	5	Much worse. Vomiting almost constant. Tongue dry, hard, and brownish. Countenance much shrunk and pale. "All the phenomena of iliae passion." A surgeon was consulted in reference to hernia.
„ 2	6	Opium was used, and asafoetida and turpentine injections. Somewhat better, but the symptoms persisting. A tobacco injection. She was so ill that it was expected she would die in the night.
„ 3	7	Somewhat better.
„ 4	8	Easier; pain less, and but little vomiting. After another tobacco enema she voided, with sharp pain, which made her faint, a gall-stone which measured an inch in diameter.
„ 5	9	Passed free motions, and was quite relieved.

The patient afterwards regained good health.

For illustration of the gall-stone passed, see Fig. 14, *a*.

The accompanying illustrations (Figs. 11, 12) are drawings of gall-stones from cases on which

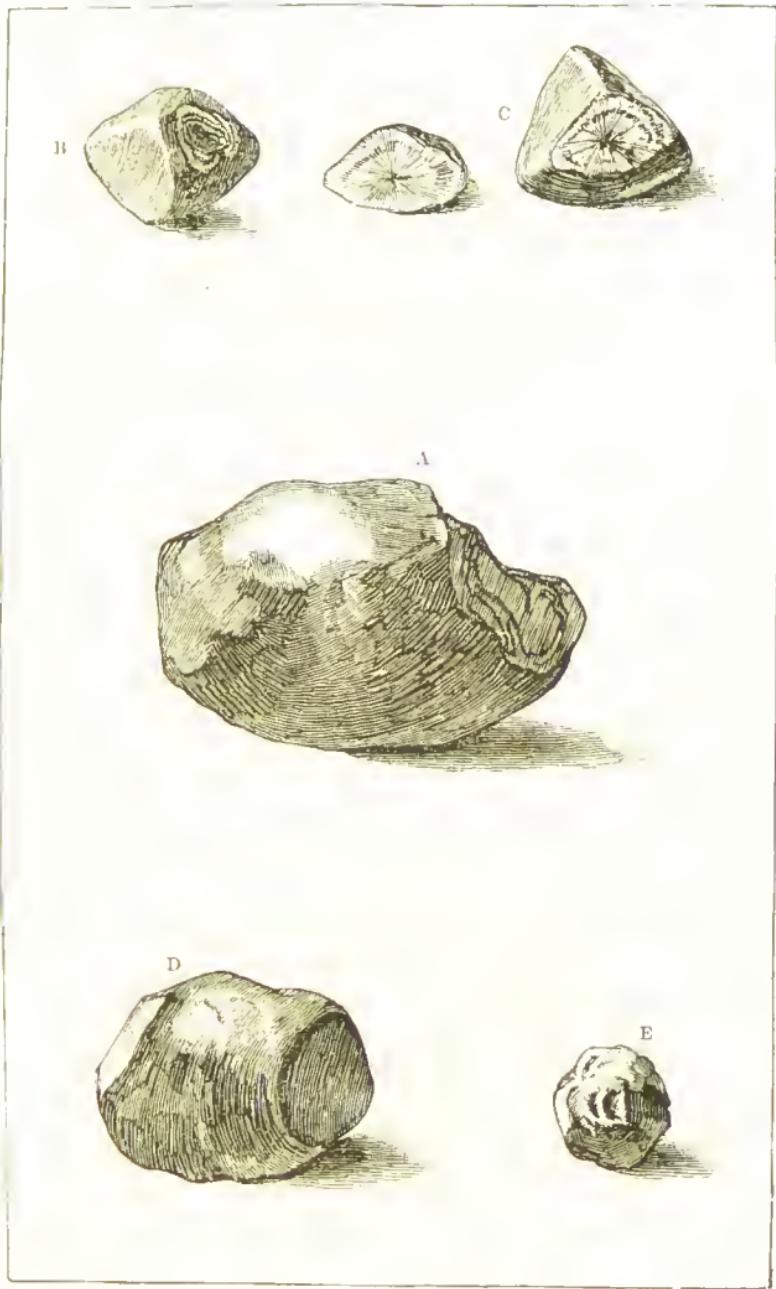
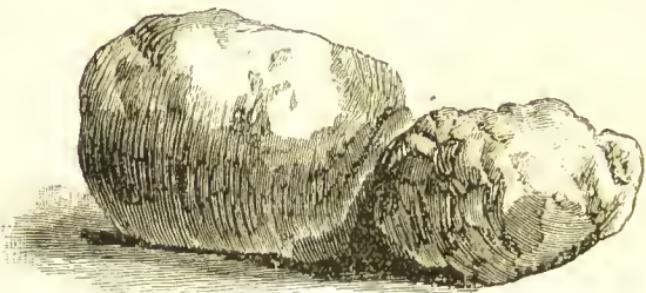


Fig. 11.—Gall-stones



A



B



C

Fig. 12.—Groups of Gall-stones.

I have operated, the reports of the cases being fully given in chapter x.

I have to thank Mr. Jonathan Hutchinson for kindly permitting me to copy some illustrations of large gall-stones from his *Archives of Surgery*: they will be found in Figs. 13, 14.

REFERENCE TO FIGURES 11, 12, 13.

FIG. 11.

- A. Large gall-stone from Case 37.
- B. From Case 1. (*See page 163.*)
- C. Section of gall-stone from Case 10.
- D. From Case 4. (*See page 178.*)
- E. Single gall-stone from Case 17.

FIG. 12.

- A. Group of gall-stones removed by cholecystotomy (Case 1). (*See page 163.*)
- B. Two gall-stones (from Case 6) removed from the gall-bladder and cystic duct by cholecystotomy.
- C. Group of gall-stones removed by cholecystotomy (from Case 22).

FIG. 13.

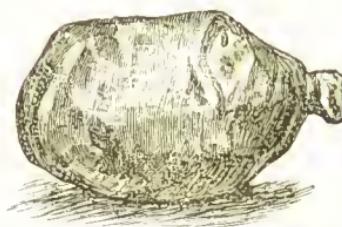
- A. The stone removed by Mr. Bryant in the case quoted at page 93. It measured more than three inches in circumference. It was removed by a laparotomy operation.

B. A stone which was removed by Mr. Bryant from the gall-bladder of a woman aged 53. A sinus existed; the concretion could be felt by a probe. The sinus was enlarged, the stone extracted, and the patient made a good recovery. (*See Transactions of the Clinical Society*, vol. xii. p. 20.) No jaundice or symptoms of biliary disease had ever occurred.

- C. A stone which was passed per anum by a woman



A



B



C

Fig. 13.—Gall-stones. (*After Hutchinson.*)

aged 53, after five days' symptoms of obstruction. The obstruction had been supposed to be due to an umbilical hernia, from which she suffered. She had never in her life had jaundice, nor had there been any attack indicative of the escape of the stone from the gall-bladder to the intestine. The stone had a largest circumference of more than three inches. It was of light sp. gr., but weighed 228 grains. (See *Medico-Chirurgical Transactions*, vol. vi.)

FIG. 14.

A. A gall-stone which was voided by an old woman after a nine days' severe illness. It weighed 160 grains; had a diameter of one inch and two lines. The case is described by Dr. Craigie in *Edinburgh Medical Journal*, vol. xxii. p. 240. A synopsis of it is given on page 95 of this work.

B, C, D are given to illustrate a fatal case of chronic obstruction by gall-stones, and at the same time the great difficulties which attend diagnosis. The patient, a woman, aged 59, died of perforation of the ileum, just above the cæcum, eight months after the probable date of escape of the stones from the gall-bladder, and after eight weeks of incomplete obstruction. The symptoms had been vomiting, constipation, and severe gripping pain, but they had been repeatedly relieved by treatment; the bowels had acted well, and at no time, until the last few days, had there been abdominal distension. There had never been jaundice, and the patient had usually enjoyed fair health. Eight months before her death she had passed through an attack of constipation, with great pain, and at that time a hard tumour could be felt in the right hypochondrium. At the autopsy the gall-bladder was healthy, and no conditions were found which threw any light upon the mode by which the stones had escaped. Each of the larger stones measured about four inches in circumference. There was no proof that any accretion had been received from the contents of the intestine.

It will be seen that in this case no permanent obstruction was caused, and that for months together the bowels acted well. Death was not from obstruction, but from perforation

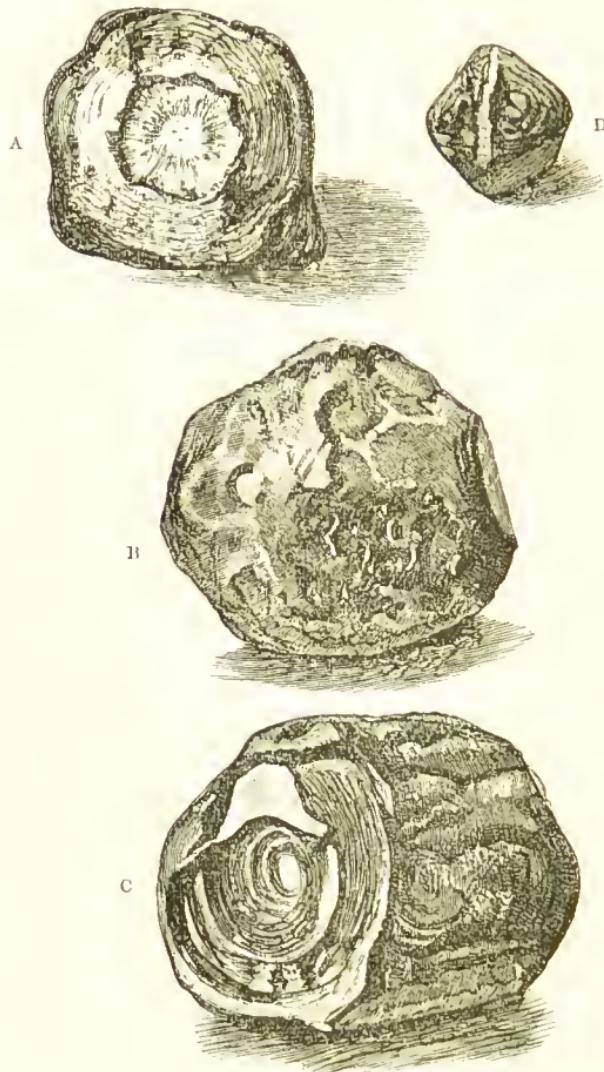


Fig. 14.—Gall-stones. (*After Hutchinson.*)

from ulceration. The fact that there were several stones, and some small, probably conduced to this result.

The case is recorded by Mr. Le Gros Clark, in the Medico-Chirurgical Society's *Transactions*. It is re-published in full, with other important illustrations of gall-stones, in the *Pathological Atlas of the New Sydenham Society* (Fascic. vii.).

The following remarks of Mr. Hutchinson serve to show how difficult, or even impossible, it may be to arrive at a correct diagnosis in this class of cases.

"To turn to the class of cases in which real obstruction is present, we may ask the question : Is it possible to make the diagnosis of a case in which the small intestine is plugged by a gall-stone ? I maintain that it is not practicable to get further than a mere conjecture. If the case is recent, it will count as one of acute intestinal obstruction, and a band or a twist, or some other form of internal strangulation, will be suspected.

"Such has, I believe, actually been the diagnosis in almost every case where the abdomen has been opened, and a gall-stone found.

"In particular, I may ask attention to one in which the operator was Mr. Bryant, than whom a more careful or experienced diagnostician could not be named. Mr. Bryant states candidly that he had before the operation taken

the case to be one of acute intestinal obstruction, due either to a band, twist, or internal hernia.

"A differential diagnosis is simply impossible, for the symptoms are the same. There is little to help us excepting the history of an early stage of symptoms referable to the region of the gall-bladder, and this is in many cases—I think in the majority—wholly wanting. If the duration of the case have been longer, and it have passed into one of chronic obstruction, we still have nothing excepting the history by which to distinguish it from cases due to other causes. Cases of block by hardened faeces and by malignant stricture may each in turn resemble it."

A careful consideration of cases that I have seen, and of others that have been reported in the journals and elsewhere, confirms my belief in the opinion so well expressed in the previous quotation; for, as a rule, it is impossible to diagnose obstruction from gall-stones from other conditions causing acute intestinal obstruction; therefore the surgeon should always bear gall-stones in mind when called upon to treat acute obstruction.

As jaundice is nearly always absent in these cases, I think it proves that these large

concretions gain access to the bowel by a process of ulceration instead of in the ordinary way through the bile ducts. I think it quite probable that the initial acute symptoms may be due to paralysis of the gut, owing to local peritonitis, although the later symptoms are undoubtedly due to the mechanical block caused by the concretion ; but arguing from the history of the cases reported and of those I have observed, it is usually impossible to make any distinction between the different stages of the affection, the patients being generally seized with pain and vomiting, and these being rapidly followed by persistent obstruction, until either the stone passes into the large intestine or gets pushed aside, ceasing to obstruct, or is removed surgically.

The following example, related by Böllinger, illustrates how the passage is effected. "In a case in which there was evidence of obstruction of the bowels, laparotomy was performed. The patient died with septicaemia, and there was found after death a large gall-stone impaled in the jejunum, and a large fistula between the gall-bladder and duodenum. There were numerous gall-stones in the gall-bladder, and several in the fistula."

If a gall-stone be sufficiently small to pass through the common duct into the intestine, it seldom or never produces intestinal obstruction, although the pain, sickness, and constipation may simulate it, and lead to a little difficulty in diagnosis. I have on several occasions been asked to see such cases by my medical friends, and I believe the similarity to be greater than is usually supposed, and it certainly is deserving of more attention than it usually receives. As a rule, in such circumstances the small stone will not be discovered in its passage through the anus, unless specially sought for; but where large gall-stones are passed with, after producing intestinal obstruction, their passage per anum is usually characterised by such pain as to lead to their discovery.

To discuss the treatment of intestinal obstruction is quite beyond the scope of this work, although it may not be out of place to mention the views of the two schools:—the one advocating early operation by laparotomy, as in intestinal obstruction due to other causes, the other advocating treatment by opium, starvation, injections, and massage under an anaesthetic.

In face of the impossibility of making an exact diagnosis, any case of acute obstruction

may be one in which speedy death is the only alternative to immediate relief, as in strangulation by a band or by an internal hernia. If laparotomy be performed, and the cause be discovered to be an impacted gall-stone, the obstruction may be removed either by needling the caleulus through the walls of the bowel or otherwise crushing it, or by pushing it onward. This failing, the stone may be removed by enterotomy, the intestine being subsequently sutured.

If it were possible to be certain that a gall-stone was the cause of the block, the expectant form of treatment would be fully justified, since the probability, arguing from published cases, is that the gall-stone would eventually pass; but, accepting the diagnostic difficulties, we cannot help feeling that if relief by medical means does not speedily come, the surgeon is accepting a great responsibility in waiting for Nature's cure.

In one case, in a lady aged sixty-five, I felt so sure of the obstruction being due to gall-stone, that I ventured to treat the case on expectant principles, using opium as required. At the end of a fortnight sudden and complete relief ensued, and a large gall-stone was

evacuated. But in this case the history of pain over the gall-bladder for a considerable time, succeeded by symptoms of peritonitis in the right hypochondrium, and then followed by intestinal obstruction, left very little doubt as to the cause of the obstruction.

The following synopsis of a paper in Mr. Hutchinson's *Archives of Surgery* cannot be omitted in considering the diagnosis of gall-stone colic.

"On Intestinal Croup or Membranous Enteritis, and its Differential Diagnosis from Gall-stone Colic.

"The following extract is from a paper by Dr. Richard Powell, published in 1820 in the *Medical Transactions of the College of Physicians*. Dr. Powell begins by stating, 'Whenever violent pain takes place in the epigastric region of the abdomen, exacerbating in paroxysms, accompanied by sickness, yellowness of the eyes and skin and urine, by clay-coloured faeces, and without any proportionate increase of action in the circulation, biliary concretions are supposed to be forcing their way through the ducts; and when these symptoms abate, it is inferred that their passage into the duodenum has been effected.'

After this Dr. Powell proceeds to state that he has often been disappointed of finding a gall-stone in the faeces, and has found instead what he proceeds to describe:—"In the cases to which I refer this residue has exhibited a large quantity of flakes, mostly torn into irregular shapes, and appearing to have formed parts of an extensive adventitious membrane of no great tenacity or firmness. In the first of the cases which came under my notice this membrane was passed in perfect tubes, some of them full half a yard in length, and certainly sufficient in quantity to have lined the whole intestinal canal. In the others also the aggregate quantity has been very large, and it has continued to come away for many days, but it has been in irregular thin flakes of not more than two inches' extent, and not, as far as I could discover, of the perfect tubular form (which would probably also have been broken down by the agitation in water, if it had existed on its first passage out of the body). I have definitely examined four such cases, in all of whom the leading symptoms have been similar, and these have led me to suspect the passage of biliary concretions at the time. They have all been adult females, and have occurred in private practice. I had attended but one of

these previous to this particular attack, and she had frequently suffered from occasional pain in the intestines and derangement of her powers of digestion, with flatulence and a sense of suffocation. She was always relieved at the time by mild opening medicine, and believed herself able to prevent the attacks.

"The more violent seizures under which I saw all the patients, consisted in a sudden and excessive pain in the epigastric region, increasing in paroxysms very frequently, rather relieved by pressure of the patient herself at the time, but leaving great soreness and tenderness during the intervals. This state continued under four days; during it the stomach was very irritable, and the tongue coated and clammy. Jaundice came on at an early period, and the stools were white, brown, or somewhat greenish, and streaked in colours, until the films began to pass, when they were mixed with a full sufficiency of bile, but not at first of a healthy colour."

After some statements as to the great advantage which he had obtained from the use of laxatives, Dr. Powell adds:—

"The formation of adventitious membrane has not been so frequently observed in the intestinal canal as it has in circumscripted cavities; and

I know not that any description of the symptoms accompanying such a state has herctofore been given. The appearancee which comes nearest to it, both in resemblance and situation, is the membrane formed in the trachea under croup, but the symptoms are there more violent and destructive, from loality of situation."

The suggestion oecurs that it is possible that in some of these eases, a *bonâ file* attack of gall-stone colic may have been the cause of the membranous enteritis. The explanation of severe pain suffered in the early stage is not otherwise easily given. It may be that Dr. Powell (and many others with him) was wrong in the expectation that all cases of gall-stone irritation are followed by the passage of the stone. He adverts to the well-known fact that in most cases in which ealeuli are found after death in the gall-bladder, all history of attacks of eolie is wanting. It may, however, not improbably be the fact that many attacks of gall-stone irritation end by the slipping back of the irritating ealeulus. The bile itself, of eourse, passes in both direetions at different times, and we may without difficulty imagine a stone impacted for a time in the first part of the duct, and causing irritation, but not so fixed as to be

inecapable of slipping back again. Be this as it may, it is important for us to know and remember that an observant physician, who was in the habit of carefully inspecting the faeces, found that in certain cases which he had diagnosed as gall-stone irritation, evidences of membranous enteritis were present and that no stone could be discovered.

CHAPTER V.

TREATMENT.

THE *treatment* of gall-stones may be considered under the headings — Preventive, Palliative, and Radical. The two former resolve themselves into medical, the latter into surgical treatment.

Medical Treatment.—The preventive treatment of cholelithiasis, like that of gout, with which cholelithiasis seems to have some relationship, is chiefly a question of diet, exercise, and general hygienic surroundings. As women suffer much more frequently than men from gall-stones, it has been thought by some that their mode of dress, and especially the wearing of stays, may be a predisposing cause, but probably the want of sufficient exercise, with its usual concomitants, constipation and rich living, are greater predisposing causes. In prescribing, therefore, prophylactic means, one would recommend rational clothing, temperance in diet, warm baths, fresh air, and regular exercise. In regard to diet, more depends on temperance than on the choice or denial of certain foods

There is no value in theoretical or empirical reasoning, and there should only be excluded excessive fatty and sugary foods, alcohol of bad quality, and notoriously indigestible matters. Dr. Lauder Brunton, in his Gulstonian Lecture, published in the *British Medical Journal* for June 20th, 1891, gives some valuable hints on treatment, and shows how the system of dieting adopted at certain watering-places, when combined with exercise and the administration of diluent beverages, water being the essential element, has very beneficial results.

I have been accustomed for some years to recommend patients suffering from cholelithiasis to drink half-a-tumblerful of the natural Carlsbad water with a little hot water before breakfast, and a tumblerful of simple hot water before the later meals, feeling that in this way they may obtain almost the same beneficial results as by residing at a Spa and drinking the water; for I think that there can be no doubt that, as a rule, too little water is taken, and the insipidated or stagnant bile deposits material which, if not removed, will tend in the long run to form concretions, just as drains if not flushed from time to time will become blocked by the deposit of solid matter.

Alkaline saline waters (particularly the hot Carlsbad) act beneficially by stimulating the peristaltic activity of the digestive tract and increasing the flow of blood to the abdominal organs. In the peristalsis the bile passages participate, and the movements of the bowels act as a form of massage, while the diseased mucous membrane benefits by the increased flow of blood. The injection into the rectum of large quantities of hot water serves the same purpose.

When gall-stones have once formed—so far as our present knowledge carries us—no medicine has the power of dissolving them or of producing material benefit, except by way of giving relief, and although there have been numerous remedies vaunted as beneficial in the dissolution of gall-stones, their advocates have argued as if they were trying to dissolve gall-stones in a test tube, apparently forgetting that their drugs have to reach the concretions by a circuitous route and in an extremely diluted form, so that benzoic acid, benzoate of soda, salicylic acid, turpentine, ether, chloroform, and numerous other agents reputed to be beneficial can really have no material effect, beyond making the patient feel that something is being done.

I would not for a moment say that rational medical treatment, as mentioned in the previous page, may not restrict the increase of gall-stones already formed, or prevent the formation of new ones, and thus prove really curative, if the patient have the good fortune to part with those already formed.

Of Fürbinger's cases, 34 per cent. are said to have been cured by medical means, 42 per cent. to have been improved, 10 per cent. not to have been benefited, and 14 per cent. to have died.

Large doses of olive oil are said to cause the expulsion and to favour the passage of gall-stones, but although I have tried it in a number of cases, I have never found it to be of the slightest service.

Dr. Kishkin's experiments apparently show how the mistaken idea of its benefit has arisen.*

The supposed calculi which were parted with were found to consist of oleic, palmitic, and margaric acids combined with lime; and similar excretions could be produced at any time by giving olive oil to any person suffering from scanty biliary secretion, no true gall-stones being ever found in the motions after the olive oil

* *Meditinskoe Obazteine*, 1889; also *Lancet*, vol. ii. p. 710, 1889.

treatment, which, it must be remembered, sometimes gives rise to distressing dyspepsia.

In justice to those who hold a belief in the benefit of the olive oil treatment, it should be mentioned that a collective investigation in reference to the use of olive oil in biliary colic has recently been made by the Therapeutic section of the Philadelphia Polyclinic Medical Society. Of fifty-four cases of gall-stone colic in which this method of treatment was used, the result was said to be as follows: two died; in three negative results were obtained; and in fifty, or 98 per cent., relief was afforded, results which, if the numbers and observations may be relied on, must be regarded as satisfactory, more especially as one patient who died was suffering from adhesive obstruction of the bile ducts. Two of the observers stated that they had treated forty other cases of biliary colic without a failure, but had kept no record of them. The *rationale* of the treatment, according to Dr. Rosenberg's experiments, is that it largely increases the quantity of bile secreted, while at the same time it diminishes its consistency; its beneficial influence consisting not so much in its power of dissolving the biliary concretions as in increasing the biliary excretion, in flushing, and

in lubricating and washing out the passages of the liver. The dose varied from a dessert-spoonful to a pint.

It must also be mentioned that Dr. Goodhart, in the *British Medical Journal* for January 30, 1892, gives the history of five cases of probable cholelithiasis in which olive oil had been administered with apparent benefit. He remarks, “With reference to the results, I wish to say that it is obvious that I cannot claim for these cases anything more than a suspicion in favour of the value of the administration of oil. In no one of the cases have gall-stones been proved to be passed, and in none of the cases has the improvement been so immediate that effect and cause certainly go together.” *

Belladonna has been said to have a specific action in cholelithiasis, and I can conceive that if a small concretion were passing along the ducts, it might, by its special action on involuntary muscular fibre, aid its expulsion; but my own experience would lead me to entirely disagree with a medical writer who says that a pill containing a quarter of a grain of belladonna and a quarter of a grain of podophyllin resin is a remedy as nearly approaching a specific as it is possible to obtain.

During an attack, hot fomentations and the drinking of hot water give relief, but of all measures, the subcutaneous injection of morphine is by far the most satisfactory.

Massage finds a strong advocate in Dr. George Harley, F.R.S., who, in a communication to the *Medical Annual* for 1890, says, speaking of massage: "For without doubt, perseverance and opportunity will, in the end, enable them [the operators] to discover gall-bladders equally as readily as the trained fingers of the expert do, and that, too, even through abdominal parietes so thick that untrained hands cannot so much as make out the boundary of the solid liver through them; while, again, they will ultimately find that they will be able to extrude small impacted biliary concretions, be they in the shape of sand, gravel, or stones, from the bile duct into the duodenum with as much safety and certainty as they can pass a catheter through a stricture into a human urinary bladder. At the same time, for the sake of the patient's welfare as well as their own reputation, they must never forget to be as careful in the mode of operative procedure in the one case as in the other, as neither operation is invariably unattended with danger. This is especially the

case when the manipulative operation has been unfortunately delayed until the gall-stones have grown large and hard, and, on account of the prolonged pressure, begin to ulcerate through the tissues they have long pressed against."

It is scarcely necessary to do more than draw attention to the description of the gall-stones in the fourth chapter and of the cases in the last chapter, in order to point out how futile, nay more, how injurious must massage, however skilfully performed, have been in these cases; for not only is it unlikely, but in by far the greater number of cases it is utterly impossible that the concretions could have been forced through the narrow passages which we know the cystic and common ducts to be.

Some little time ago I was called to a distance to operate on a patient who had been under this treatment judiciously and systematically carried out, and had nearly died under the process; so that I had to operate in a much more unfavourable condition than would otherwise have been the case. I was, however, fortunately able to remove the gall-stones, and the patient is now well. I can only say that were I the subject of cholelithiasis, I would not submit to massage, nor could I conscientiously

recommend it, as although it may possibly aid in the expulsion of small calculi, it is impossible to diagnose the absence of large ones, and to know the exact condition of the ducts, which may possibly be ruptured by manipulation.

It will thus be seen that medical treatment may prove of great service in the early stages of the disease, but that when once the gall-stones have attained to any size, or are in considerable numbers, and are producing serious symptoms, the only rational mode of treatment is by operation.

What, then, are the indications for surgical treatment in cholelithiasis?

(a) In cases of repeated attacks of biliary colic apparently due to gall-stones, which, not yielding to medical treatment, are wearing out the patient's strength.

(b) Where there is evidence of suppuration in the neighbourhood of the gall-bladder set up by gall-stones.

(c) In empyema of the gall-bladder, which is usually accompanied by peritonitis.

(d) In dropsy of the gall-bladder.

(e) In obstructive jaundice, when there is reason to think that the common duct is occluded by gall-stones. But it must be borne

in mind that jaundice adds to the risk of the operation.

(f) In acute or in perforative peritonitis starting in the region of the gall-bladder, where the previous history of the patient is suggestive of the presence of gall-stones, which in one of the ways previously mentioned may be the cause of the trouble.

The operations which may be performed on the gall-bladder and ducts are cholecystotomy, cholecystectomy, cholelithotripsy, and cholecystenterostomy; but before describing these in detail it may be better to mention two minor operative procedures which are sometimes adopted.

(1) *Sounding*.—Puncture with a long fine needle has been employed to sound the gall-bladder for calculi, and a long fine probe introduced through a cannula has been similarly applied.

That this is not unattended by danger is proved from the fact of death having occurred after puncture in a case of Dr. Harley's, which is reported in the *Medical Times and Gazette*, May 17, 1884. If exploration be necessary, it is best done by a small incision over the gall-bladder, large enough to admit the finger.

(2) *Aspiration* through a fine needle may be

performed in cases of distended gall-bladder, but it is to be borne in mind that serious symptoms have been known to follow the operation, and that in very few cases can it give more than temporary relief. I, however, know of one case, reported by my friend Dr. Irving, of Huddersfield, where after aspiration of a distended gall-bladder, with serious symptoms of obstruction, the patient made a complete recovery.

If aspiration be decided on, the skin over the site of puncture should be cleansed, a clean fine needle should be employed, and the gall-bladder should be emptied as far as possible, so as to remove all tension.

CHAPTER VI.
CHOLECYSTOTOMY.

Cholecystotomy, as its name indicates, consists in opening the gall-bladder, and although it may have to be performed for other conditions, it is by far the most frequently called into requisition for the removal of gall-stones, and is unquestionably the operation *par excellence* for that purpose.

In the *Mémoire de l'Académie de Chirurgie*, vol. lxiii., Jean Louis Petit fully describes the operation as it is now performed, and at the same time discusses the subject of cholelithiasis; but although these views were expressed so early as 1733, the operation was not actually undertaken until 1867, when Dr. Bobbs, of Indianapolis, removed fifty small calculi from the gall-bladder, and closed the incision by one suture, his patient recovering.*

In 1869 Mr. Lawson Tait removed some gall-stones from a suppurating gall-bladder by slitting up a sinus discharging from the umbilicus.

The attention of the profession was, however, more especially drawn to the importance of the subject by Dr. Marion Sims, who performed the operation in Paris on April 18th, 1878, eleven

* *Transactions Indiana State Medical Society*, 1868, p. 68.

years after Dr. Bobbs' case. Unfortunately, Dr. Sims' patient died after eight days, not from the operation itself, but because the operation had been delayed too long.

Dr. Sims' case possesses so much historic interest, that a brief abstract will not be out of place. The patient, a lady aged forty-five, had suffered from jaundice and swelling of the gall-bladder several months before operation, and one month before operation the tumour was aspirated, and thirty ounces of dark brown fluid were evacuated, with temporary relief. At the time of operation, April 18th, 1878, the tumour had again filled, and there were manifest signs of inflammation around it.

As the patient had been suffering from persistent vomiting and bleeding from the nose, the case was looked on as hopeless, and operation only undertaken as a *dernier ressort*.

A large number of gall-stones was removed, part of the hypertrophied gall-bladder was taken away, and the edges were attached to the margin of the incision. At the post-mortem, sixteen gall-stones were discovered, and there was no malignant disease; so that had the operation been performed earlier, the patient would probably have recovered.

On August 18th, 1879, Mr. Lawson Tait performed what appears to have been the second successful operation, removing two large gall-stones, one from the gall-bladder and one from the cystic duct, the gall-bladder also containing twelve to fifteen ounces of white fluid. The edges of the gall-bladder were stitched to the margins of the wound. Since that time the operation has been done a great number of times by different operators with considerable success; and to Mr. Tait undoubtedly belongs the credit of having popularised the operation with the profession.

The statistics of the operation vary very considerably in different hands; and as in ovariotomy experience leads to greater success, so in cholecystotomy those who have done a number appear to be the most successful. It is difficult and misleading to group together all cases of cholecystotomy for statistical purposes, as the results vary considerably, according to the condition of the patient. I would therefore rather arrange them under three headings.

1st. Those unaccompanied by jaundice.

2nd. Those where jaundice is present at the time of operation but without malignant disease.

3rd. Those where there is jaundice dependent on malignant disease.

In the first class, as will be seen by referring to my cases in the final chapter, I have had no deaths. I should look on a death in this class as a calamity, and with due precaution avoidable.

In the second class, the complications, such as haemorrhage due to a vitiated condition of the blood, the difficulties in overcoming the obstruction, the greater liability to shock or exhaustion, the prolongation of the operation, and the lowered condition of the system will inevitably lead to a marked increase in the mortality, as shown by Musser and Keen, and as published cases prove.

The third group of cases will inevitably present such a lethal list as to lead one to question the wisdom of operating where malignant disease can be certainly diagnosed.

It should be mentioned that M. Terrier proposes in cases of obstructive jaundice due to cancer, to open the gall-bladder and drain it, with the view of relieving the jaundice and of prolonging life.

My own experience, as in Cases 8, 9, 26, and 29, is not favourable to operating on patients suffering from jaundice dependent on obstruction due to malignant disease; and I consider that operation should only be undertaken when the

risks have been fully explained to the patient. But in connection with this class of cases, reference should be made to the fact that a simple exploratory operation has apparently been the means of curing cases to all appearances of a malignant nature; and in the *Annals of Surgery* for August and September, 1891, Dr. J. W. White gives some rather startling records of the "curative effects of operation *per se*," in which a simple laparotomy seems to have effected a cure in cases apparently hopelessly malignant.

Case 21 is perhaps one in point, for I certainly left the operating table under the idea that the patient had malignant tumour of the pancreas, and that nothing more could be done; yet the woman recovered, and regained her health.

The following cases of Mr. Tait's, reported in the paper referred to, are good illustrations of apparent cure from simple laparotomy.

In a case of violent hepatic pain, jaundice, etc., the liver was found covered with small seed-like bodies, which were thought to be miliary abscesses. Nothing was done. She immediately improved, and entirely recovered.

In another with hepatic symptoms, large hard nodules of the liver were found, and appeared to be undoubtedly carcinomatous. No

attempt at removal was made. Recovery was prompt and complete.

In another, a large, indurated, immovable mass in the position of the head of the pancreas was thought to be unquestionably cancer. The history and general appearance of the patient corroborated this diagnosis. Nothing whatever was done, but in a few days the patient began to improve, and in seven weeks not a trace of the tumour was to be felt. She has remained in robust health.

Many other illustrations could be given, not only in abdominal but in brain surgery, and in the surgery of other parts, but in the present state of our knowledge the results are inexplicable, and must be simply stated as facts.

Arguing simply from my own cases, I venture to give the following statistics:—

In Class I.—Mortality, nil ; 25 cases without a death.

In Class II.—Mortality, nil ; 9 cases without death. An accidental death at the end of the third week after operation, and apparently unconnected with it, must be mentioned. If included, it would make the mortality 11·1 per cent.

In Class III.—Mortality, 33·3 per cent.; 6 cases, with 2 deaths, due respectively to haemorrhage and shock.

In the October number of the *Edinburgh Med. Jour.* for 1889 Mr. Lawson Tait gives a list of fifty-five choleceystomies, with three deaths.

In the *Lancet* for November 26, 1887, for December 8, 1888, and for April 11, 1891, is a record of all the cases of choleceystotomy performed by Mr. Knowsley Thornton up to the last date, nine in number, with one death, and in that case the gall-bladder was sutured and returned. This number does not include two cases of abscess presumably caused by gall-stones, but where the peritoneum was not opened, nor two cases where the common duct was incised and the gall-bladder not opened. These cases all recovered.

Mr. Greig Smith, in his work on Abdominal Surgery, states that the mortality of the operation in skilled hands should be very small: probably not more than six per cent. Depage, in the *Lancet* for January 12, 1889, records seventy-eight cases, with fourteen deaths: out of six cases in which the gall-bladder was sutured, three died from peritonitis; of the other seventy-two, eleven died, five from haemorrhage and collapse.

The indications for the operation are

practically the same as those mentioned on page 121 ; in other words, I look on cholecystotomy as the operation *par excellence*, in the treatment of disease of the gall-bladder, and especially in the treatment of gall-stones.

Preparation of Patient.—If there be time—as is usually the case—the patient should take an aperient, so as to have the bowels freely moved the day before the operation. The abdomen should be thoroughly washed and a carbolic dressing applied twelve to eighteen hours before the appointed time. The patient should have no food for six hours previous to operation. The anaesthetic which I prefer and usually employ, if there be no contra-indication, is ether, but in case of any tendency to lung or bronchial trouble, the A.C.E. mixture is administered. The incision I usually adopt is one commencing just below the ninth costal cartilage, and continued downwards vertically for three or four inches, when skin, superficial and deep fasciae are divided, and the linea semilunaris exposed and incised, muscular tissue being avoided as far as possible ; after this the fascia transversalis is cut through, and when all vessels have been seized by catch forceps, the peritoneum is raised by means of dissecting forceps and notched, with

the knife lateralised, a director being inserted through the small incision, and the peritoneum being further divided over it.

Should there be a tumour, the incision will have to be made over the most prominent part of the swelling. The fluid contents of the cyst should be drawn off by an aspirator before proceeding further, the opening in the gall-bladder being afterwards enlarged; the edges are then seized in catch forceps, and drawn to the surface. If, as is often the case, there be no tumour, the finger is passed through the incision to the under surface of the liver, when, in the absence of complications, to be mentioned later, the gall-bladder will be felt, and if there be any concretions either in it or in the ducts, they will be easily palpated through the walls. Before proceeding further, one or more flat sponges are pushed into the abdomen, so as to avoid soiling the peritoneum. If the gall-bladder be collapsed, two pairs of catch forceps are put on the fundus, and an incision made between them, either by means of a scalpel or scissors, any bleeding point being at once secured. Forceps are then passed through the opening in the bladder, and the gall-stones are removed: whole, if small but if large it may be necessary to crush them and

remove them in fragments. If the gall-bladder permits of it, this part of the operation is rendered easier by an assistant gently drawing the edges of the opening in the bladder to the surfacee. The peritoneum is kept from being soiled by the sponges plaed within the abdomen, and by an assistant wiping away any fluid as it escapes from the opening. After all the gall-stones have been removed from the gall-bladder, either by the forceps or seoop, the finger is passed into the abdomen along the outside of the duet, and should any other stones be felt, they must, if possible, be removed.

This may be effected by passing the forceps or seoop into the duet, and guiding their action by the fingers plaed within the abdomen, but outside the duets. On several occasions I have succeeded in pushing gall-stones from the eystie duet into the gall-bladder by gentle digital manipulations, but it goes without saying that great force is inadmissible. Should it be found impossible to displaee the stones in the ways mentioned, a round needle may be pushed through the wall of the duet into the ecretion, in order to break it up, when the fragments may perhaps be got away; or the operation of cholelithotry may be performed by means of

forceps with guarded ends, or by means of the finger and thumb. Should the stones prove too hard to be broken up, the method adopted by Mr. Knowsley Thornton may be employed, the duct being incised, the gall-stones removed, and the opening sutured. (See *Lancet*, April 4, 1891.) For these deep manipulations a wide speculum may prove of service, if strong broad retractors do not show the parts sufficiently well. These remarks also apply to gall-stones impacted in the common duct, but as the common duct is placed farther from the surface, the manipulations and operative measures are effected with greater difficulty, and in all probability the parietal incision will have to be made larger.

If thought desirable, and if the gall-bladder be empty, the gall-stones may be treated in the common duct without opening the gall-bladder.

After the gall-bladder and the ducts have been thoroughly cleared, the edges of the incision in the bladder are drawn to the surface and sutured to the upper end of the parietal incision, either by means of continuous or interrupted sutures of thin silk or chromicised catgut, the sutures passing through skin, parietal peritoneum, and the edge of the gall-bladder.

Mr. J. W. Taylor described in the *British*

Medical Journal, Jan. 21st, 1888, how in a case of cholecystotomy, with a gall-stone impacted in the cystic duct which he could not remove, and which he felt it would be dangerous to crush, he succeeded in softening and ultimately disintegrating the stone by having the gall-bladder syringed out night and morning with hot water through the fistulous opening. At the end of two weeks the impacted stone was so loose and soft that it broke in pieces on being grasped with Lister's sinus forceps, the fragments being then extracted without difficulty.

In a similar case I adopted this method for a time with only partial success ; I then resorted to the injection of a few drops of turpentine dissolved in ether, which produced severe pain for about an hour, after which the passage became free, and remained so ; the result being probably due to the forcing onward of the partially dissolved calculus by violent peristalsis, set up by the irritating and solvent injection.

The remainder of the abdominal opening is closed either in the ordinary way by interrupted silk sutures passing through skin, aponeurosis and parietal peritoneum, or the layers are sutured separately, the latter procedure in my experience leaving the patient less prone to ventral hernia.

This method of suturing the gall-bladder to the surface is the one usually adopted by most operators, but I believe it is more prone to be followed by fistula than the mode I now always adopt, which is to suture the cut edge of the gall-bladder to the aponeurosis and parietal peritoneum, and not to the skin, thus leaving a layer of subcutaneous tissue between the opening in the gall-bladder and the surface. A rubber drainage-tube is inserted into the gall-bladder, and made to project on the surface, a safety-pin being passed through it to prevent its disappearance. In case of distended gall-bladder this part of the operation is perfectly easy, but where the bladder is shrunken and contracted, or matted by adhesions, it is often extremely difficult, and at times impossible, to complete the operation in this satisfactory method. Fortunately, the presence of healthy bile in the peritoneum, although undesirable, is not necessarily fatal, as proved by a case recorded by Thiersch, who removed successfully over forty pints of bile from the abdominal cavity after the gall-bladder had been ruptured by a blow. Experiments performed by Schüppel and Boström apparently proved that the peritoneum can absorb extravasated bile without

serious trouble. It will thus be seen that where the edges of the gall-bladder cannot be brought to the surface, the insertion of a drainage-tube, by allowing the bile to escape externally, will prevent any material quantity from passing into the peritoneum; and although I have on one or two occasions inserted a glass tube into the right kidney pouch, where I feared extravasation might occur, and Mr. Thornton has on several occasions inserted a tube into Douglas's pouch through a hypogastric incision, I think this precaution will usually be found to be quite unnecessary. In one case where suppuration had produced disorganisation of the walls of the gall-bladder, so that I could find nothing definite to suture, I simply packed the wound with gauze for a few days, and allowed it to granulate.

In two cases where the gall-bladder was small and could not be made to reach the surface, I brought up the right border of the great omentum, and sutured it to the margin of the gall-bladder and to the parietal peritoneum, thus shutting out the general peritoneum cavity. It will often be found possible to depress the parietal peritoneum and fit it to the margin of the incision in the gall-bladder, when it is impossible to bring the gall-bladder to the skin.

In those cases where there has been much local peritonitis, numerous and often firm adhesions will be met with, and as important viscera may be involved, care has to be exercised in their division. I usually prefer to find the lower margin of the liver, and to separate adhesions as they are met with by means of the fingers, arresting bleeding by sponge pressure; but at times the adhesions are so firm that they must be divided by means of scalpel or scissors. If the bleeding have been at all troublesome, or the parts have had to be freely manipulated, a glass drainage-tube is inserted and brought out through the lower end of the parietal incision, it being withdrawn on the earliest possible occasion, or as soon as the discharge becomes small in quantity and free from blood; this not only prevents any accumulation of wound products in the peritoneum, but also prevents continued bleeding from small vessels, as first pointed out by Mr. Tait in pelvic haemorrhage after ovariotomy.

The drainage-tube in the gall-bladder may be shortened on the second day, and if the passages seem clear, as shown by the discharge of bile, it may usually be removed on the third or fourth, the parietal sutures being removed on the eighth day, and the wound supported by strapping.

The dressing I have usually employed is first a layer of antiseptic gauze, either sal-alenib-roth, carbolic or double cyanide, and over this a pad of absorbent wool, at first salufer or salicylic, and later either gamgee tissue or simple absorbent wool. The dressing, which is retained in position by means of strapping and bandage, must be changed as frequently as necessary, according to the amount of discharge. As it is important to avoid yielding of the cicatrix, the patient is usually kept in bed for a fortnight, on the couch for another week, and allowed to be up in the fourth week, but it is important to keep the wound supported by a pad and belt for some time longer.

In order that new deposits may not form, it is important that the patient should be cautioned against the use of too rich food, that exercise should regularly be taken, that diluents in the shape of water before meals should be used, and that a saline aperient should be given in the morning from time to time.

The operation of cholecystotomy has been modified in various ways, the most important modification being the so-called "ideal" operation, where the incision in the gall-bladder is stitched up, the mucous membrane being closed by a

continuous suture, and the serous coat by Lambert's stitches. Langenbach recommends this method in the *Centralbl. für Chir.*, 1887, No. 25 : and in the *Revue Med. de la Suisse Romande*, Oct. 10th, 1890, Dr. Roux gives an account of two successful cases in which he sutured the three coats of the gall-bladder separately.

But that this ideal cholecystotomy is dangerous, Lange, Meredith, Küster, and Keen have demonstrated, for if the gall-bladder becomes distended the stitches give way ; and besides, the whole operation must be undertaken anew if there should be a fresh formation of calculi, while in the ordinary cholecystotomy a simple incision might be sufficient to relieve the bladder of its contents. On these grounds the operation with suture of the gall-bladder was decided by the last Surgical Congress to be inadvisable. The idea of this ideal cholecystotomy apparently rests with Campaignac, but it was also suggested by Sir Spencer Wells.

Although Bobbs had a success by closing the gall-bladder with one suture, Meredith in 1883 performed the next operation of this class, the patient dying from an escape of bile into the peritoneum. The operation, if we may judge from published cases, does not give good results,

and those who have had much experience in performing cholecystotomy, consider that it is attended with more risk than the ordinary operation with drainage.

Loreta thought that by elaborating the mode of suture, success might be made more certain, and after closing the mucous membrane with a continuous suture he applied two rows of Lembert's sutures to bring together the peritoneal surfaces.

In the *Central. fur Chirurg.*, No. 13, 1888, Dr. Zielewicz reported that he had performed cholecystotomy successfully with ligature of the cystic duct, remarking that the operation was simpler and less dangerous than cholecystotomy, and avoided the danger of biliary fistula; but we conceive that this operation presents all the disadvantages of cholecystectomy, to be mentioned later, and at the same time would be certain to lead to after-trouble, from the accumulation of the proper secretion of the gall-bladder itself.

We have to consider another modification of cholecystotomy, suggested by Bloch, and afterwards modified by Richter, Chelius, and Kocher.

The operation consists in incising the parietes over the gall-bladder as far as the peritoneum, which is not opened. The wound

is then plugged with antiseptic gauze for six or eight days, when adhesions will have formed between the parietal and visceral peritoneum, and the distended gall-bladder may be incised without opening into the peritoneal cavity.

Dr. Jones, in the *Medical Chronicle* for March, 1887, reported a successful case of this kind, the gall-bladder having been opened on the sixth day, giving exit to several ounces of pus and a large gall-stone.

We only mention this operation because it has been practised by several good surgeons, and apparently with considerable success; but it can only be employed in cases where a tumour is present. With ordinary precautions, we consider any advantages which the operation may be supposed to possess, quite counterbalanced by the delay necessary before the second part of the operation can be carried out. An operation performed in this way will of course also prevent any intra-abdominal exploration of the ducts, and would necessarily mean the leaving of the greater number of cases incomplete, as the ducts can only occasionally be freed by manipulations through the gall-bladder, if unaided by the fingers in the peritoneal cavity.

CHAPTER VII.

CHOLELITHOTRITY.

ALTHOUGH cholecystotomy is the usual operation performed for gall-stones, cholelithotriy may have to be done as a separate and distinct operation, either where the gall-bladder cannot be opened on account of its position or where it contains no calculi, the stones being placed deeply in the cystic or in the common duct.

Cholelithotriy was first suggested and performed by Mr. Lawson Tait, as a sequel to the operation of cholecystotomy. The method has been criticised adversely by Dr. H. Delagrenière, who advocates cholecystenterostomy in place of crushing, which he believes to be a dangerous operation, since the gall-stones have to be crushed through the walls of the duct. I have myself performed cholecystenterostomy successfully, and should be prepared to do it again if I found an insuperable obstruction in the common duct, but I confess that I should not think of doing it if I were able to crush or otherwise remove the obstruction: as although

statistics of the seven cases reported (six recoveries and one death) would seem to prove the operation to be a fairly successful one, any operation involving opening of the bowel must be accompanied by the special dangers incident to intestinal surgery.

The name cholelithotomy might possibly be applied to the crushing of stones or the nibbling them away by means of forceps placed within the biliary passages after the gall-bladder has been opened, the fragments or diminished stones being pushed backward into the gall-bladder by means of the fingers placed outside the duct, thus aiding and guiding the forceps within. But this is not quite what is understood by cholelithotomy, which holds a different position to ordinary lithotomy, since the stones are crushed through the walls of the canal in which they lie. This may be accomplished in some cases by means of the finger and thumb when the concretions are soft, or by means of padded forceps if the stones be too hard to yield to digital pressure; and should this fail, the method of puncture with a fine round needle may be employed, which will in some cases cause the stone to split up into smaller fragments. The needle puncture need cause no anxiety, as when

the needle is withdrawn the puncture immediately closes.

When these manipulations have to be effected in the common duct, it will as a rule be necessary to make the parietal incision rather larger than the one usually employed for cholecystotomy : and should these means fail to thoroughly clear the ducts, or should the stone prove too hard to be crushed or diminished, the parts may be more fully exposed by means of large retractors or by means of a special speculum, and the ducts may be incised for the removal of the obstruction, sutures being applied to close the opening through which the stone has been withdrawn.

It goes without saying that great force is inadmissible, and that considerable judgment must be exercised as to how much force can safely be employed.

The following cases, fully reported in the last chapter, serve to illustrate the operation.

Case 34 is a simple example of cholelithotomy, where it was considered inexpedient to open the gall-bladder, on account of its position, owing to an abnormal anatomical arrangement. Had there been any difficulty I should not have hesitated to open the gall-bladder, remove the

stones, and insert a drainage-tube, trusting to this to prevent fouling of the peritoneum.

Case 35 is also one of cholelithotomy pure and simple, where the gall-bladder was contracted and placed very deeply.

Case 24 is an example of cholelithotomy, where the gall-bladder had become atrophied, and where a gall-stone was crushed in the common duct.

Case 27 is an example of cholelithotomy, performed at the same time as cholecystotomy, and is a good example of several similar operations which I have performed, where it has been found impossible to clear the ducts through the gall-bladder incision.

Case 30 is an example of relief by cholecystotomy, with recurrence of the symptoms within a few months. And as it was suspected that one or more gall-stones had escaped observation in the former operation, the abdomen was re-opened after sixteen months and a gall-stone crushed.

CHAPTER VIII.

CHOLECYSTECTOMY.

THOSE who advocate the operation of cholecystectomy in place of cholecystotomy argue that the latter operation is followed in a number of cases by fistula, which may be either mucous or biliary, according to the site of obstruction ; and by a reference to the cases published in the last chapter it will be seen that such a result may occasionally occur if there be a blockage of the ducts which cannot be removed.

In such circumstances it is also manifest that unless the obstruction be removed, the fistula cannot safely be closed, even if it were possible to do it ; but it seems to me that those who advocate the removal of the gall-bladder in these cases lose sight of the fact that if the gall-bladder be removed, and if the common duct should by any accident become closed, there is nothing to save the patient from fatal jaundice. We think, therefore, that cholecystectomy should seldom, if ever, be performed as a primary operation, since, should a persistent mucous fistula follow cholecystotomy, cholecystectomy can

always be done on another occasion, as in Cases 2 and 7, where mucous fistulae, dependent on stricture of the cystic duct, as the result of gall-stones, persisted after the operation of cholecystotomy, and where cholecystectomy was afterwards done with complete success.

Langenbach not only proposed the operation, but himself performed it for the first time on July 18th, 1882, since which time it has been done by him thirteen times, and also by Thiriard, Courvoisier, Tillmans, Morris, Thornton, myself, and others.

The advocates of the operation say that it is attended with less risk than cholecystotomy, as proved by statistics, Depage having collected twenty-two cases, with only two deaths. But Courvoisier collected twenty-eight cases with seven deaths: one from nephritis, two from collapse, and four from peritonitis, caused on one occasion by perforation of the common duct by a calculus, and on the other three by the effusion of bile into the peritoneum.

According to Thiriard, the mortality is 10 per cent.; and even Langenbach has had two deaths out of thirteen cases.

The advocates of the operation argue as follows: (1) The operation of cholecystotomy is

often followed by a fistula. Cholecystectomy avoids this. (2) Calculi form, or at all events almost always increase, in the gall-bladder. (3) The operation of cholecystectomy is simpler and less dangerous than cholecystotomy. (4) The gall-bladder is an organ not indispensable to life, and may easily be spared.

Against these arguments we would advance the following :—(1) Cholecystotomy is very seldom followed by fistula, except in cases of irremediable obstruction of the ducts, and in such cases, unless the obstruction be in the cystic duct, the removal of the gall-bladder would be very dangerous. (2) Not only my own experience but that of Mr. Lawson Tait also goes to prove almost certainly that gall-stones may form in the ducts, or even in the liver, although doubtless some form in the gall-bladder and the greater number increase there. (3) Statistics go to prove that cholecystectomy is more dangerous than cholecystotomy; for where there is an absence of jaundice, death after cholecystotomy should not occur; now, cholecystectomy can only be performed in these cases, as no surgeon would be likely to remove the gall-bladder in the presence of jaundice. (4) It is no argument that because we do not quite know the

function of an organ, the individual would be as well without it.

It would seem to me that the indications for cholecystectomy are very limited, and I would only perform it in the following circumstances.

(1) Where, after cholecystotomy, the gall-bladder is contracted and cannot be sutured to the parietes, and where, if the common duct be quite clear, it will be a much simpler matter to remove the gall-bladder and ligature the cystic duct than to try to drag the contracted organ to the surface; but even in these cases we know that it may be perfectly safe to insert a drainage-tube and do without the sutures.

(2) When, after perforation from ulceration or empyema, the walls of the gall-bladder are so changed as to make suture impossible; but even in these cases, simple drainage will probably be quite as efficient, as in Case 4, page 178.

(3) Where a mucous fistula persists, as in Case 1, or where, as soon as the fistula closes, pain occurs, due to the accumulation of mucus in the gall-bladder, there being a complete obstruction of the cystic duct and a free passage for the bile along the common duct. In such cases cholecystectomy offers the only chance of cure, as in Cases 2 and 18.

The operation is performed through the same incision as for cholecystotomy, and the gall-bladder is separated from the liver, to which it is only attached by the reflections of peritoneum, by connective tissue, and by a few blood-vessels.

The separation of the gall-bladder from the liver is best done by the fingers, aided when needful by scissors. It is commenced at the fundus and carried down to the cystic duct, which is then isolated, and simply ligatured with silk, the distal parts being then removed.

In Case 18, after ligature of the cystic duct, I cut away the redundant mucous membrane, and brought the serous coats of the duct together by two sutures, applying a piece of omentum over the stump; but as the stump is situated deeply, this complicated method involves time, and is somewhat difficult to perform. I think, however, that it renders the operation safer and more complete. The parietal incision requires to be rather larger than for cholecystotomy, and if more room still be required, Courvoisier's transverse incision just below the ribs may be employed.

Hæmorrhage from the torn surfaces may be rather free, but sponge pressure will arrest the greater part; forceipressure or catgut ligatures

may, however, be called for to complete the haemostasis. Should bleeding prove really troublesome, a glass drainage-tube, by preventing the accumulation of blood, will usually be effective.

The operation is rendered easier by the employment of a strong retractor to draw upwards the margin of the liver, and, as in cholecystotomy, the area of operation should be isolated by means of sponges.

CHAPTER IX.

CHOLECYSTENTEROSTOMY.

Cholecystenterostomy is the name used to designate an operation which has for its aim the establishment of a fistula between the gall-bladder and the intestine. In this manner Nature effects a cure in certain cases of chole-lithiasis, adhesion being first produced between the gall-bladder and a contiguous portion of the intestine, the gall-stones passing by a process of ulceration from the one cavity into the other. The idea of artificially establishing such a connection in cases of obstructive jaundice seems to have occurred independently to the minds of Drs. Harley, Gaston, Nussbaum, and Winiwarter; Dr. Harley, in his work on "Diseases of the Liver," making the following remark:—"The triumph of operative surgery would be to establish an artificial fistula between the gall-bladder and the duodenum, for then not only would the pent-up bile be removed, but the disturbances arising from the non-admittance of bile into the intestines would likewise be at the same time overcome. I am not quite sure," he says, "if in these days

of antiseptic surgery the operation is not practicable; for I can see no reason why the adjacent surfaces of the gall-bladder and duodenum should not be eroded by potassa fusa, and speedily stitched together."

In 1880 Nussbaum suggested the possibility of this operation in cases of obstructive jaundice. (*Deutsche Chirurgie, Lieferung*, 44, p. 94.)

On the 20th July, 1880, Winiwarter, of Liége, first performed the operation, establishing a communication between the gall-bladder and the colon.

Dr. Gaston, of Atlanta, apparently quite independently of any previous suggestions, in a series of experiments on dogs, showed how a communication might be established between the duodenum and gall-bladder (*Atlanta Medical and Surgical Journal*, October, 1882), which operation he termed duodeno-cholecystotomy; and, as shown by the diagram (Fig. 15) that accompanied his second paper (in *Brit. Med. Journal*), this method restores the bile to the intestinal canal, where its physiological functions are accustomed to be performed.

This operation of duodeno-cholecystotomy was actually performed for the first time by Monsieur Terrier in 1889, it being the seventh case

of cholecystenterostomy, as shown by the table on pages 160-161, drawn up by Dr. Delagenière.

An extremely valuable monograph on the subject was published in 1890 by Dr. Henry Delagenière, who gives a description of all the operations performed up to the date of issue of his work.

The indications for the operations are—incurable biliary fistula, due to insuperable occlusion of the common bile duct, and obstructive jaundice, due to the same cause.

By a reference to the table it will be seen that six of the operations were undertaken for the relief of obstructive jaundice, and that thus far, my own case, published in the *Transactions of the Royal Medical and Chirurgical Society*, is the only one in which the operation has been undertaken for the cure of a biliary fistula, as it is also the only successful case of cholecystenterostomy which has been performed in England.

At the time the operation was performed I was unaware that it had been suggested as a remedy for this condition, but I now find that Mr. Alfred Willett suggested its performance for the cure of a biliary fistula following cholecystotomy; his patient unfortunately died before it could be put into execution.

A comparison of the statistics of the different operations on the gall-bladder, as collected by Dr. Delagenière would seem to show, strange to say, that although cholecystenterostomy is apparently the most complicated, it is the least dangerous operation.

7 Cholecystenterostomies	with 1 death = 14 per cent.
99 Cholecystotomies	" 17 deaths = 17 "
38 Cholecystectomies	" 9 " = 23 "

I cannot accept these cholecystotomy statistics as fair, as they were collected from all sources. (See page 129.)

The operation.—It is important to thoroughly prepare the patient before performing this operation, which is rendered both easier and safer if the intestine, especially the part which has to be sutured, be emptied. The patient should therefore have no food for twenty-four hours before the operation, during which time he should be fed by nutrient injections. An efficient aperient should also be administered two days before, and, if needful, also on the day before operation. The abdomen should be thoroughly washed, and a carbolic dressing applied for at least twelve hours before the operation. The incision may be made either in the right linea semilunaris or in the linea alba,

according to the state of distension or otherwise of the gall-bladder. We prefer to make the incision in the right linea semilunaris. The incision must be sufficiently long to enable the necessary manipulations to be made: say, three or four inches. If the gall-bladder be distended, it must be emptied by aspiration, and then opened near the fundus or on its under surface. The portion of bowel to which it has to be fixed must then be selected.

Now, although Dr. Gaston proved the possibility of affixing the gall-bladder to the duodenum in dogs, and although this has been shown practicable in the human subject by Dr. Terrier's operation, we have found, on attempting it in the human subject, that on account of the depth and fixity of that portion of the bowel, the difficulties are much greater than if a lower loop be selected, as it is quite easy to trace the jejunum from its fixed point, and to select the

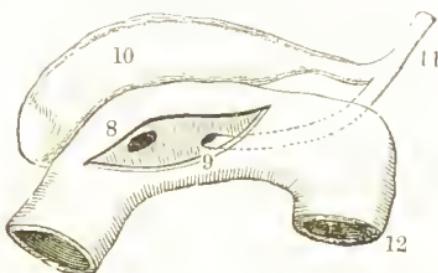


Fig. 15.—Specimen from Dog that died on the eleventh day after attaching Gall-bladder to Duodenum by elastic ligature. (*From the British Medical Journal, February 5, 1887.*)

8, Fistulous opening of cavities; 9, entrance of common duct; 10, gall-bladder; 11, duct; 12, pyloric curvature of duodenum.

next loop which approaches the right side of the abdomen. We should think that although the bile will in this way be made to enter the intestine a few inches lower down, it can make no serious difference to digestion. In my own case the hepatic flexure of the colon was the part selected to effect the anastomosis, for reasons stated in the history of the case.

Whatever part may be selected, the loop must be isolated and clamped, either by means of clamps, of which Hahn's would seem to be the best, or by a simple elastic ligature, which I prefer, and have employed with success. The isolated loop is held up by the finger and thumb of the right hand, and then drawn between the index and middle fingers of the left, thus emptying it of its contents. The assistant then encircles it with a loop of indiarubber tubing (drainage-tube), which is tied with one knot, the two ends of the ligature being then seized by pressure forceps just beyond the knot. In this way the bowel is not only emptied of its contents, but rendered bloodless, and as soon as the operation is completed the pressure forceps are removed, and the single knot unties itself or is easily unloosed. By this means, which I believe I was the first to employ, all complicated

apparatus is rendered unnecessary, and no time is lost. By marking two rings, by means of a scalpel point, on the surface of the gall-bladder and bowel respectively, the outer ring of sutures is more easily adjusted in its proper position, the posterior Lembert's sutures being best applied first and cut off short, the anterior ones being inserted, but not tightened until the opening is made in the bowel.

After the openings have been made in the gall-bladder and bowel, it is easy to apply a few sutures to unite the incised margins of the two cavities; the outer row of sutures is then easily tied and cut off.

If the operation has been undertaken for fistula, as in my own case, the edges of the old fistula will have to be pared and united by a continuous suture, the sutured margins being tucked in, and an outer row of Leinbert's sutures applied.

During the operation, the gall-bladder and loop of bowel are isolated by sponges, thus avoiding exposure of the other viscera and preventing soiling of the peritoneum.

The parts are then carefully sponged and returned into the abdomen, the parietal incision being brought together either by interrupted

	Name of Surgeon.	Age of Patient.	Sex.	Symptoms and Diagnosis.	Date of Operation.
1	Winiwarter.	34	M.	Chronic jaundice. Gall-bladder enormously extended, following obstruction of the common duct. Cause unknown.	1st, July 20, 1880. 2nd, July 24, 1880. 3rd, Aug. 6, 1880. 4th, Nov. 29, 1880.
					5th, Jan. 9, 1881.
					6th, Nov. 14, 1881.
2	Monastyrki.	50	F.	Jaundice. Biliary tumour. Obstruction of common duct by cancer of pancreas.	May 4, 1887.
3	Kappeler.	55	M.	Jaundice. Biliary tumour. Obstruction of common duct by cancer of pancreas.	June 7, 1887.
4	Socin.	51	F.	Jaundice. Biliary tumour. Obstruction of common duct. Cause unknown.	Nov. 19, 1887.
5	Bardenheuer.	?	M.	Symptoms of complete obstruction of common duct.	?
6	Mayo Robson.	42	F.	Biliary fistula, following cholecystotomy.	March 2, 1889.
7	F. Terrier.	54	F.	Jaundice and biliary tumour. Obstruction of common duct. Cause unknown.	July 13, 1889.

Operation.	Result.	
<i>Six Operations.</i>		
1st.—Colon and bladder fixed to the abdominal wall.	Cure.	No information.
2nd.—Trochar passed through the bladder into the intestine.		
3rd.—Gall-bladder opened. Trochar left in place.		
4th.—Laparotomy. Gall-bladder sewn to the small intestine, then puncture made with a bistoury. External fistula.		
5th.—Plastic operation to close the fistula; result, a stercoral fistula with colon, and another with small intestine.		
6th.—Several operations for the intestinal fistula.		
Fistula made in small intestine. Two openings united by two rows of sutures.	Cure.	Death, July 4, 1887, from cancerous cachexia.
Fistula made in small intestine. Two openings united by two rows of sutures.	Cure.	Death, Sept. 23, 1888, from eachexia.
Fistula made in small intestine. Two openings united by two rows of sutures.	Cure.	No information.
Fistula made in the duodenum by means of an elastic thread.		Death; no information as to cause of death.
Fistula made in the colon. Two rows of catgut sutures. Closure of old fistula.	Cure.	Living and well, Jan., 1892.
Fistula made in the duodenum. Only one row of serous sutures. Communication established by bistoury. Tube placed in the two openings.	Cure.	Living, 15 Jan., 1890.

sutures through all the layers of the abdominal wall, or, if time permit, by separately suturing the peritoneal, aponeurotic, and cutaneous layers, which I think makes a firmer cicatrix, and one less liable to hernia.

Should it be thought necessary, a glass drainage-tube may be placed in the right kidney-pouch for two or three days, when, if there be any leakage, this will probably save fouling of the general peritoneal cavity.

The after-treatment differs in no respect from the other operations on the gall-bladder, the patient being allowed sips of barley-water or plain water for the first twenty-four hours, tea or a little milk and soda-water, or chicken broth, during the second twenty-four hours, beef-tea, with milk pudding, on the third day, fish on the fourth, and then ordinary diet.

CHAPTER X.

REPORT OF CASES TREATED SURGICALLY BY THE
AUTHOR.

CASE 1. *Cholecystotomy for distended gall-bladder dependent on gall-stones.*—Mrs. B., æt. thirty-three, a thin, nervous, weakly-looking, but apparently healthy person, of temperate and regular habits, and without anything special to mention in her family history, consulted me in June, 1884, on account of a lump which she had noticed six months previously in the right side of her abdomen. It was then about the size of a hen's egg, gave no pain, was not tender, could be freely moved across the abdomen to the left side, pushed up to the right ribs and nearly down to Poupart's ligament; the abdomen being quite flaccid, it was easy to trace the pear-shaped outline of a tense swelling, dull on percussion, whose apex passed up to the margin of the liver to the right of the notch in the anterior border; in fact, it could be grasped in the hand, and there could be no doubt whatever that the tumour was a distended gall-bladder. She then told me that

there was a sense of dragging, with some uneasiness, but no actual pain, although occasionally at infrequent intervals, some time back, she had had what she termed spasms, and twelve years ago she distinctly remembered an attack of intense pain in the region of the stomach, which continued more or less for a week, and which had been pronounced inflammation; but she was quite sure that she was not jaundiced, and that she never had had an attack of jaundice.

Her excretions were perfectly normal in every respect, and there was no disease of other organs. I explained her case to her, and told her that I saw no immediate danger nor even any serious indication to interfere actively then, but that in case of increase of the swelling, pain, or other trouble, I should advise an operation. Soon after this she became pregnant of her fifth child, went through the pregnancy, and got over her confinement, I am told, without any difficulty. In June, 1885, I was asked to see her again, as her tumour was larger, and was causing considerable uneasiness, both mental and physical. On examination, I found the tumour with all its previous characteristics, but quite doubled in size and extremely tense: in fact, I could not help feeling that it might rupture and produce fatal

peritonitis if she received any concussion of the abdomen; hence I advised operation, and asked Mr. Wheelhouse to see the case with me. He endorsed my opinion.

June 21, 1885.—With all the usual measures as to cleanliness, and with full antiseptic precautions, including the spray, I performed cholecystotomy, my brother, Mr. Herbert J. Robson, giving ether, and my cousin, Mr. F. H. Mayo, assisting me. An incision of one inch and a half was made over the centre of the tumour along the linea semilunaris, to the right of the umbilicus; three small vessels were ligatured and the peritoneum was opened, exposing the tumour; the needle of an aspirator was introduced, and half a pint of clear fluid withdrawn. The gall-bladder was partly drawn through the opening, and after sponges had been packed around it, an opening of half an inch was made with the scalpel, and the right index finger introduced into what appeared to be an empty sac; but at the bottom of the empty sac an opening was found which would just allow the little finger to pass through into another cavity, "the dilated cystic duct" containing gall-stones, of which eight were removed by means of long slender forceps; the stones were of a dark brown

colour and were faceted, varying from the size of a large pea to that of a bean. A probe passed to the depth of five inches, and pushed in all directions, failed to discover another calculus, and the finger passed into the peritoneal cavity all along the duct could feel nothing abnormal. The peritoneal coat of the gall-bladder was now carefully sutured to the edge of the parietal peritoneum, and the mucous coat to the skin, by means of a series of No. 2 chromicised gut sutures, which were used to fasten up the remainder of the wound unoccupied by the gall-bladder, just as one suture the abdominal wound after ovariotomy. A large indiarubber drainage-tube was inserted into the gall-bladder, and the wound was dressed with salicylic wool over a layer of gauze dipped in perchloride solution.

The patient was kept on barley-water for the first twenty-four hours, and afterwards on milk, gradually returning to ordinary diet. The pulse never rose above 80 nor the temperature above 99°.

On the seventh day the large drainage-tube was removed, the wound being all healed except the opening into the sac; on the fourteenth day she was allowed to get up, but on the eighteenth

day, as the fistula, though contracting, kept open, I passed the blades of a slender pair of forceps, and at once felt a stone about the size of a bean, which I easily removed. The next day she went for a drive, and shortly afterwards journeyed to the seaside with her family.

September 7.—She complained of a feeling of moisture under the dressing, and on examination there was found to be a small fistula, just admitting a fine probe, which could be passed for a distance of five inches without eliciting any feeling of uneasiness, and which, although it was passed in all directions, failed to discover any calculus. From first to last there has never been a tinge of bile in the dressing or any sign of pus, the only discharge having been clear and watery: evidently the secretion of the gall-bladder.

At present (September 28) the opening is almost, if not completely, closed. Her general condition is improving, and she is free from pain.

In 1891, six years after operation, the patient was in good health, and so little inconvenienced by the slight mucous fistula which persisted as to feel it unnecessary to have any further treatment.

CASE 2. *Cholecystotomy for distended gall-bladder depending on gall-stones.*—Fräulein L. S., æt. twenty-two, a nursery-governess, residing near Skipton, was admitted February 11, 1885, into the Leeds General Infirmary, under the care of my colleague, Dr. Churton, who has kindly allowed me to refer to his notes for the history of her case before she was transferred to the surgical side. She stated that she had been quite well up to December, 1884, when she began to suffer from constipation, a fortnight often elapsing before she could have her bowels moved. Medicine had no effect, and since December 11 she had required injections regularly. She continued thus without any other symptoms until three weeks before admission, when she began to vomit after every meal. After a fortnight she had to be fed by the rectum, as nothing could be retained by the stomach, and this had continued for a week before her admission. The vomit had always been sour, sometimes bitter, but never yellow nor faecal: but once, a week previously, she vomited some blood. The abdomen had never been greatly distended, except after long attacks of constipation.

Condition on admission.—Patient was a well-nourished, dark-complexioned girl, with a

healthy-coloured skin and large prominent eyes, showing the trace of old inflammation in the shape of adherent irides and scarred and hazy corneæ. There was no history of syphilis and nothing special in the family history.

Her heart and lungs were healthy and the urine was normal. A hard nodular mass, dull on percussion and tender on manipulation, could be felt on the right side of the abdomen, over the course of the hepatic flexure and the ascending colon. The tongue was slightly furred. Although her appetite was good, she always vomited a few minutes after taking anything.

From time to time long tube enemas were given, bringing away scybalous masses. Various methods of treatment were adopted, and Dr. Churton twice explored the swelling by means of an aspirator needle, without finding any fluid.

On April 26, she being somewhat better, but the tumour persisting, I was asked to see her with Dr. Churton.

A hard, resistant, oval mass, dull on percussion, somewhat fixed and unfluctuating, occupied the right side of the abdomen. With one hand placed on the right loin and another in front, it could distinctly be felt bimanually, and could be moved forward like an enlarged

kidney, but not laterally. Although it reached nearly to the liver, it did not seem to be connected with it. The lump was decidedly tender. There were no enlarged veins on the surface of the abdomen. It was felt that it might be (*a*) distended gall-bladder, (*b*) faecal accumulation, (*c*) syphilitic tumour, (*d*) malignant growth, or (*e*) morbid growth in the kidney.

Against its being distended gall-bladder were the shape of the tumour, the absence of lateral movement, the absence of previous attacks of pain, and apparently the absence of fluid.

Against its being malignant were the age, general appearance and condition of the patient, who gained weight on the cessation of vomiting.

If it had been faecal accumulation, the use of large enemas would have dislodged it, and there would probably not have been any tenderness. On deep and careful palpation, the right kidney could be felt, thus disposing of the kidney hypothesis. Hence it was decided to give specific treatment a trial before resorting to operative means; as, although there was no distinct history of syphilis, the eyes led one to suspect there might be an hereditary taint.

As she did not improve, the vomiting continuing, and the tumour remaining as before,

she was transferred to the surgical side of the hospital.

On July 20, with the usual antiseptic precautions, I made an incision along the right linea semilunaris for about three inches, having to cut through a considerable thickness of tissue and to tie numerous vessels before I reached the peritoneum, on opening which I at once discovered the tumour to be a distended gall-bladder, from which I drew off by means of the aspirator eight ounces of perfectly clear fluid, sp. gr. 1004, neutral, not viscid, free from albumen and microscopic elements, but containing about as large a quantity of chlorides as is contained in normal urine; the fundus of the gall-bladder being then extruded, an incision of three-quarters of an inch was made into it and the finger introduced, discovering a gritty feel, due to numerous small, many-faceted, white calculi, with yellow nuclei, the largest not being above the size of swan-shot. These were removed by means of a lithotomy scoop, and after all had been apparently cleared out the finger was introduced into the abdomen to feel if the duct were clear. Nothing abnormal being felt, the peritoneal surface of the gall-bladder was sutured to the parietal peritoneum by

numerous interrupted chromicised gut sutures, and the cut edge of the gall-bladder to the skin, the remainder of the wound being closed as in ovariotomy. A large drainage-tube was left in the gall-bladder, and over a thin layer of wet carbolic gauze, salicylic wool was applied as a dressing.

After the first few hours of ether sickness the vomiting absolutely ceased, and beyond a little pain, due to flatulence, there were no further symptoms to record, the pulse and temperature being normal throughout.

The tube was removed on the fourteenth day, and she was allowed to be up on the sixteenth. The dressings had at first to be changed daily, on account of the free clear discharge from the tube, but after the second week they were only changed every fifth or sixth day.

On August 9, after a slight attack of pain, several small concretions were found on the dressing, and at sundry subsequent dressings tiny stones were discovered.

August 29.—I passed a pair of very fine forceps and removed several small calculi. Although I passed the instrument quite along the cystic duct, I could find no more.

She was made an out-patient, and told to report herself weekly.

On September 15 the fistula had completely closed, and she asked to be allowed to go home to Germany. She was feeling well and strong, could take her food heartily, and had less difficulty with her bowels ; she had gained flesh considerably.

The fistula re-opened after a time, and continued to discharge a little clear mucus. As this was found to be an annoyance, cholecystectomy was performed, and the patient made a satisfactory recovery.

CASE 3. *Empyema of gall-bladder, probably the result of gall-stones ; acute peritonitis ; cholecystotomy.*—For the notes from which the history of this case has been abstracted I am indebted to my house-surgeon, Mr. F. Hudson.

Mrs. V. B., *aet. forty-two*, was admitted into the Leeds General Infirmary January 9th, 1888, on account of a tumour on the right side of the abdomen, which was accompanied by symptoms of acute peritonitis. She had had abdominal section performed a year previously by me for pelvic disease of several years' standing, which had produced confirmed invalidism, and after the removal of the cause, a right pyosalpinx, she had been able to resume her work, and for several months had enjoyed excellent health, and

been able to perform very arduous duties as a general servant in a large family, her menstrual functions being regular and painless. Three weeks before admission she began to experience pain in the right side of the abdomen without apparent cause; she then noticed a small rounded swelling, tender on pressure, in the right hypochondriac region; there was no jaundice, and the bowels were regular. The swelling and pain increased, and compelled her to give up her work. She was seen by her medical man, Mr. Loe, three days before admission, when there was very marked tenderness over the swelling, which seemed to be decidedly increasing. Her general condition became rapidly worse, and nothing could be retained on the stomach; the vomit being of a dark brown colour. She suffered from great pain and intense thirst, the abdomen being tympanitic and the pulse frequent and weak.

On admission to the infirmary on January 9th the patient had an anxious expression, and lay on her back, with the knees drawn up. She complained of great pain in the right side of the abdomen, markedly increased by pressure, deep respiration, or turning on her side. There was a distinct sense of resistance in the right

hypochondriac and iliac regions, with dulness on percussion; but on account of the extreme tenderness, palpation was rendered difficult. Respirations 30, pulse 130.

The faeces had a normal colour. The urine was normal, except that it gave Gmelin's reaction for bile-pigment.

On January 13, 1888, she became jaundiced. It now became evident that she would soon die unless relieved by operation, and on January 14th abdominal section was performed through the upper part of the right linea semilunaris, exposing a large cyst with thickened walls, which yielded by aspiration eight ounces of fetid pus. After the gall-bladder had been emptied it was incised, and then explored, sponges having been previously packed round it. The finger was passed along the peritoneal surface of the cystic duct as far as possible, and beyond this, but inside the duct, was passed a long metal probe, thus exploring as far as the junction of the cystic with the hepatic duct; the finger was also passed along the outside of the common duct as far as the duodenum, but no gall-stone or other obstruction could be felt. Around the common duct, as well as over the cystic duct, plastic lymph had been thrown out; and

this probably explains the subsequent course of events.

The gall-bladder was stitched to the skin, and a drainage-tube inserted, the remainder of the wound being closed by silk sutures passed through all the layers of the abdominal wall, including the peritoneum.

For the first twenty-four hours the discharge remained clear, colourless, and mucoid ; in the second twenty-four hours it became slightly tinged with bile, and on the third day the discharge appeared to be pure bile. On the fourth day a smaller drainage-tube was inserted, and the stitches were removed on the seventh. The jaundice had quite disappeared forty-eight hours after the operation. The patient made an uninterrupted recovery, with the exception of having a biliary fistula, through which apparently the whole of the bile was discharged ; for both the faeces and the urine showed no trace of biliary matter, either by inspection or on chemical examination.

During the fifteen months subsequent to the operation the patient's digestion was unimpaired unless she took too much fatty matter, and then she became sickly and lost her appetite, and rather more fat than normal was passed in the

motion; the bowels were quite regular without the use of aperients, and the odour was in no wise different from that of healthy fæces. Repeated measurements were made of the whole of the bile discharged during twenty-four hours, and a careful analysis of the bile thus collected was made.

For details of these and other observations, see page 19.

Now, although the patient was in good health, her condition was a very miserable one, since no apparatus could be made to fit sufficiently accurately to catch the whole of the bile, except when she was in bed. When out of bed she had to catch the overflowing bile in absorbent cotton, which was retained in position by means of a bandage, thus necessitating her frequently changing her dressings and clothes. On one occasion, when she was unable to change the wool, the wearing of her bile-saturated garments gave her a severe chill, which resulted in an attack of pelvic cellulitis.

She was so miserable at the prospect of having to go through life with her fistula, that when I mentioned to her the possibility of again turning the bile into the bowel, she said she would risk anything to be rid of her trouble.

I asked my colleagues to see her with me, and they agreed that choleeystenterostomy was perfectly justifiable if its risks were fully explained to the patient.

Her consent was at once granted, and on March 2nd, 1889, cholecystenterostomy was performed, for details of which *see* page 264.

CASE 4. *Cholecystotomy for suppuration in and around the gall-bladder, depending on gall-stones.*—Mrs. G. T., æt. forty, was admitted to the Leeds Infirmary on May 18, 1888, under the care of Dr. Churton. She had had two distinct attacks of biliary colic thirteen years and seven years previously, having been jaundiced both times. In March, 1888, she again began to suffer from pain in the right hypogastrium, extending to the hypocondriae and lumbar regions and into the right shoulder; but on that occasion there was no jaundice. Since March her symptoms had never cleared up, her general health had failed, and a swelling had developed under the right ribs.

On admission, there was in the right hypocondriae and lumbar regions a hard round projection, firm to the touch, dull on percussion, and moving with respiration.

Dr. Churton diagnosed the case as one of

cholelithiasis with distended gall-bladder, and asked me to see the patient with a view to operation. On June 14 abdominal section was performed, the incision being made directly over the tumour, which seemed to be composed of liver, gall-bladder, stomach, and omentum matted together. No fluctuation could be made out, and the tumour seemed so firm, hard, and nodulated, as to give the impression of its being malignant. An exploring syringe pushed deeply into the swelling simply withdrew a little blood ; but on pushing the needle through the overlapping edge of the liver, in the direction of the cystic duct, pus was withdrawn.

On attempting to separate the liver from what was supposed to be the gall-bladder, pus began to well up, but fortunately none of it escaped into the peritoneal cavity, as sponges had been packed around the opening. About two ounces of greenish-yellow pus escaped, and on dilating the opening sufficiently to admit the finger, gall-stones were at once felt, one of which, about the size of a small walnut, was easily removed ; the second, impacted in the cystic duct, was grasped with forceps and broke in removal, leaving the distal portion still within the duct ; this was removed with considerable

difficulty, as, on account of the matting of the parts, the finger could not be passed behind the cystic duct to aid in its expulsion : after its removal, the index finger, on being pushed into the duct as far as possible, discovered another impacted stone, which, after repeated attempts, it was found impossible to remove.

As the sequel showed, this was perhaps rather a happy circumstance, for on account of the depth, the friability, and the adhesions of the gall-bladder, it was found impossible to suture it to the surface, as the stitches would not hold ; hence, after the suppurating cavity had been washed out with a solution of fluosilicate of soda (10 grs. to the pint) and a drainage-tube had been inserted, the upper and lower ends of the incision were drawn together by silk sutures, so as to somewhat limit the opening. The peritoneal cavity was left freely open, two sponges being placed on each side of the opening into the gall-bladder, so as to absorb any discharge flowing out of it. The sponges were at first changed every two hours, antiseptic precautions being adopted during the process. At the end of two days they were removed, one being simply applied directly over the drainage-tube, so as to

press the parietal peritoneum into contact with the visceral.

During the first two days there was some sickness, which was relieved by the administration of seidlitz powders until purging was effected. The discharge from the wound was clear and serous, and no bile was seen. The sutures were removed on the seventh, and the drainage-tube on the tenth day.

When discharged, on July 21, there was only a small patch of granulations in the centre of the incision.

The patient regained her good health, and the wound completely closed.

CASE 5. *Cholecystotomy for distended gall-bladder, due to obstruction of the cystic duct by two large gall-stones.*—The patient, Mrs. J., æt. forty, first noticed a small, hard, rounded tumour in the right lumbar region two years previously, which at first gave her little inconvenience, but subsequently, as it increased in size, caused a heavy dragging sensation in the abdomen, which was worse when the patient moved about. There had been no jaundice and very little acute pain.

On admission, there was a hard, smooth, non-fluctuating, pear-shaped tumour, about the

size of a goose's egg, situated below the right costal margin. When the patient was on her back the tumour could be only indistinctly felt, but when she turned on her left side it became more prominent, and could then be readily isolated. It seemed to be connected above with the liver, and moved upwards and downwards during respiration.

July 9, 1888.—An incision of $2\frac{1}{2}$ inches was made in the course of the right linea semilunaris over the centre of the tumour. On opening the gall-bladder, after several ounces of clear fluid had been withdrawn by means of an aspirator, a large gall-stone, $1\frac{1}{2}$ inch by 1 inch, was found, with the end firmly fixed in the cystic duct. This was removed, when a second stone of almost precisely the same size was felt farther on in the cystic duct. This was broken up by means of polypus forceps into several pieces before it could be removed, the removal being aided by the fingers in the abdomen pressing on the cystic duct, and working its contents on towards the gall-bladder. The gall-bladder was sutured to the skin, a drainage-tube inserted, and the rest of the wound closed.

Immediately after the operation bile commenced to flow, necessitating two dressings daily

for the first two days, and afterwards a daily dressing. The sutures were removed on the seventh day, and the drainage-tube on the eighth. The discharge of bile gradually ceased, and on August 4th a note was made to the effect that the wound had almost closed, and that there had been no discharge of bile for a week.

She was discharged cured, with the wound healed, within the month.

CASE 6. *Cholecystotomy for distended gall-bladder due to gall-stones.*—Mrs. A. H., æt. forty-two, was sent to me by my friend and late house-surgeon, Mr. Ambrose Atkinson, and admitted to the Infirmary on July 27, 1888. The history given was that nineteen years previously she had had a severe attack of jaundice, when there was noticed in the right hypochondrium a small, hard, smooth, round tumour, which disappeared after a few days, the jaundice also passing away. She had had occasional attacks of jaundice up to two years before admission, when the swelling returned, accompanied again by jaundice, but without the ordinary biliary colic; since that time she had never been free from pain or jaundice, or both, for many weeks. On admission the patient was slightly jaundiced, having just recovered from a

characteristic attack. The tumour, which was felt in the right lumbar region, was dull on percussion. It could be moved freely from side to side, and during respiration it rose and fell with the liver.

On August 1st a vertical incision was made in the right linea semilunaris, immediately over the tumour, when one stone was felt in the gall-bladder and another in the cystic duct; the former was readily removed, the latter with some difficulty, assistance having to be given by the fingers placed within the abdomen. The gall-stones were about the size of walnuts. The fluid removed from the gall-bladder was alkaline, slightly viscid, and of a faint yellow colour; albumen and mucin were present in large quantities, but no bile salts or pigment. Under the microscope, granular cells of various sizes were found and cholesterin crystals. Bile first appeared on the dressings on August 4th; the tube was removed on the 5th, and the sutures on the 8th.

The bile was discharged in gradually decreasing quantities until August 20th, when there was no trace of it on the dressings.

When she left the infirmary on August 25th, the wound was healed, and she was perfectly

well. A year afterwards she was in good health and had had no return of symptoms.

CASE 7. *Cholecystotomy for symptoms of cholelithiasis without tumour.*—Mrs. S. G., at forty-nine, was sent to me by my friend Mr. Horn, of Barnsley, and was admitted into the infirmary on August 27, 1888. The history given was, that a year ago last July she had the first of a series of attacks of severe abdominal pain, which commenced in the right hypochondriac region, extending thence more or less over the whole abdomen and shooting into the right shoulder. The first attack of pain was noticed in the evening soon after her tea, and lasted for two hours, being then only relieved by opium. The pain caused her to "double up," and to be covered with a cold clammy perspiration. For a day or two before the attack she had been jaundiced. After the attack of pain the yellow tinge of skin gradually disappeared. The second attack, similar to the first, and fully as severe, came on in November, 1887, and the third in February, 1888; after this the attacks recurred every few weeks, and on some occasions two, or even three of them followed each other in rapid succession. Slight jaundice supervened on each attack, but that symptom had never been so

marked as during the first seizure. The urine had at times been highly coloured, when the motions had been like pipe-clay. On one occasion last February she found a gall-stone in the faeces. No tumour had at any time been made out.

Operation, August 29.—An incision was made vertically downwards from the ninth costal cartilage on the right side. On opening the peritoneum no gall-bladder could be seen, but on passing the index finger to the under surface of the liver a hard pyriform tumour, about the size of a small jargonelle pear, was discovered, and with difficulty drawn into view. This turned out to be the gall-bladder; and on opening it, it was found tightly packed with numerous small gall-stones, which were for the most part about the size of a pea, some being rather larger. These were removed, and others blocking the cystic duct, even as far as the common duct, were also taken away; the extreme end of the common duct was not within reach. In all, sixty-six stones were removed. The edges of the incision in the gall-bladder were, after some little difficulty, brought to the surface and sutured.

On the evening of the operation, and during

the earlier part of the subsequent day, the patient had a little pain, which gradually subsided. The tube was removed on September 1, and the sutures four days later. Bile continued to be discharged from the wound until September 9, after which no more was seen on the dressings, and the patient was discharged within the month, with the wound healed.

In March, 1889, she reported herself as feeling very well, and as having been free from the attacks of pain; the cicatrix seemed firm, but she said that it had discharged a little clear fluid on two or three occasions from a very tiny aperture.

CASE 8. *Cholecystotomy for malignant disease of head of pancreas; jaundice; distended gall-bladder.*—Mr. G. B., aet. fifty, was kindly sent to me by Dr. Clifford Allbutt on July 28, 1888, suffering from intense jaundice with great enlargement of the liver and extreme distension of the gall-bladder, the liver being quite a hand's-breadth below the lower border of the ribs, the gall-bladder reaching almost to the hypogastric region.

He gave the history of having suffered from dyspepsia for ten or twelve years, and from time to time, at varying intervals of from three

to six months, he had had sudden attacks of pain over the liver, unaccompanied by jaundice and removed by poulticing. His general health in 1887 was better than formerly, but about Christmas, after a meal of pork, which produced violent purging, he was seized with severe pains across the abdomen at the level of the umbilicus, and soon afterwards became jaundiced. Since that time his motions had always been white, and his urine "like porter." Although he had not suffered from pain since the attack at Christmas, he had always felt distended after food, and had been much troubled with flatulence. The jaundice had never disappeared.

On July 28 he looked thin, and had an anxious expression of countenance; his skin was intensely jaundiced, and the subcutaneous fat seemed to have entirely disappeared. He stated that he had lost a stone in weight during the previous two years, but only a little since Christmas. His legs swelled towards evening. His appetite was good. Pulse 76, regular. The liver reached to within one inch of the umbilicus: the gall-bladder was distended, and reached as far as $2\frac{1}{2}$ inches below the umbilicus. There was no tenderness over the abdomen and no ascites could be made out.

As the patient was rapidly running down, and operative procedure was the only form of treatment that seemed to be likely to benefit him, I advised cholecystotomy. He took some time to consider the question, but decided that if an operation had to be done it should be done in the Leeds Infirmary. No word was received from him until September 10, when he was much weaker, and, if possible, more intensely jaundiced. The liver reached to the umbilicus, and the gall-bladder had increased in size. An operation was performed, with full antiseptic precautions, the incision being made in the linea semilunaris over the upper part of the distended gall-bladder, from which thirty ounces of clear fluid were removed. The tissues cut through presented a most unhealthy greenish colour. Very little bleeding occurred, except from the cut edge of the gall-bladder, and this was arrested by pressure forceps. No gall-stones could be felt, and careful exploration along the course of the ducts failed to detect the cause of the obstruction, for neither gall-stones nor tumour could be felt. The patient's temperature after the operation was perfectly normal during the first week; but on the second day oozing of blood from the lower edge of the opening in

the gall-bladder occurred, and this was arrested by pressure forceps as before. The dressings had to be changed, however, twice daily, owing to the continued oozing from the gall-bladder and the suture wounds, which at the time of operation had not bled in the slightest. This became so serious on the eighth day that the patient had an attack of syncope, and during my absence Mr. Littlewood, the resident surgical officer, transfused the patient, using a saline fluid. This only gave temporary relief, and he sank exhausted on the ninth day, apparently purely from loss of blood. Food had been taken well ever since the operation; there had been no sickness, no abdominal distension, no pain, no elevation of temperature, and absolutely no bad symptom except this constant oozing of blood. Ruspini's styptic, hamamelis, and other internal haemostatics were fully tried without benefit, and the application of solid perchloride of iron to the bleeding points only produced temporary arrest of haemorrhage.

The following notes are taken from the report of Dr. Barrs, hon. pathologist to the infirmary. "The whole of the surface of the body was of a deep saffron colour. Emaciation to a medium degree. All the organs of the body

bile-stained except the brain. Only slight adhesions had formed between the gall-bladder and the parietes. There was some slight blood infiltration of the parietes below the wound. There was no peritonitis, and no fluid or blood in the peritoneum. The gall-bladder, with the opening into it, was filled with a mass of coagulated blood; the walls of the gall-bladder were deeply stained with blood, but were otherwise normal. A small director was easily passed without force through the papilla in the duodenum, and at once found its way into an immensely dilated common bile-duct, the calibre of which was as large as that of the small intestine. The cystic duct could not be discovered. The bile ducts and liver were immensely dilated. The common duct was slit up, and the head of the pancreas was found to be involved in a dense, hard, fibrous mass. The pancreas presented a most remarkable appearance; in addition to the hard, fibrous condition of its head, the parts beyond were converted into a cavernous structure—clearly the result of obstruction to its duct; the whole organ was larger than natural, but there was no growth except the one in the head. There was no fungation or ulceration into the pancreatic ducts.

The liver was much larger than natural, of a deep olive colour, from jaundice. On microscopic examination, the hard mass in the head of the pancreas was found to be scirrhus cancer."

CASE 9. *Cholecystotomy for cancer of common bile-duct; jaundice; distended gall-bladder.*—Wm. T., æt. forty-two, a jet worker, was admitted into the infirmary under the care of Dr. Churton, suffering from jaundice, with a tumour in the region of the gall-bladder, and pain in the right side of the abdomen. He had not been very temperate up to the time of his illness, which began two years previously with an attack of hepatic colic. For eighteen months he had had frequent similar seizures, generally coming on soon after a meal, with shivering, nausea, vomiting, headache, and acute pain in the epigastrium. He also became slightly jaundiced at each attack, the jaundice passing off in the intervals. The swelling in the abdomen had been noticed for twelve months. He had not had an attack of pain since May, but from that time he had always been jaundiced, and the swelling in the abdomen had been steadily increasing.

On admission, he was thin and deeply jaundiced; the liver dulness began at the sixth rib, and extended to within half an inch of the

umbilicus. In the middle of the edge of the right lobe, at the level of the umbilicus, was a smooth round swelling about the size of a hen's egg, giving an indistinct feeling of fluctuation. There was some tenderness over the liver in the epigastric region, but none over the tumour.

Dr. Churton asked me to see the patient, with a view to performing cholecystotomy, as he was rapidly running down, and suffered from fever, with occasional rigors and sweating, all of which symptoms were suggestive of suppuration.

Operation (December 23).—After incising the parietes in the right linea semilunaris, the tumour was aspirated, several ounces of a brownish straw-coloured fluid containing pus-cells being removed. Very considerable haemorrhage occurred during the dissection through the parietal wall, and much time was spent in ligaturing the bleeding points instead of applying pressure, as in the last case. The gall-bladder was incised sufficiently to admit the finger, and after exploration it was stitched to the abdominal parietes with fine catgut sutures. On exploring the cavity of the abdomen, several hard nodules could be felt on the liver, and a good many adhesions; no stone could be felt in the bladder or bile ducts. A drainage-tube was

introduced through the opening in the gall-bladder, and the abdominal wound closed with catgut sutures. The patient seemed relieved for a few days, the pain being less and the temperature lower; but although the wound did well and the drainage of the gall-bladder prevented any accumulation of fluid, after a few days the old symptoms returned—irregular pyrexia, with chills and night-sweats—and his appetite did not improve. The sutures were removed on the seventh day, when the wound, except the opening into the gall-bladder, was healed.

There had been no haemorrhage, no general abdominal distension, and nothing special except a little bronchial catarrh. He returned to the medical ward, and the old symptoms gradually brought about death by exhaustion on January 5.

Post-mortem report.—Liver not enlarged, surface smooth but dull, and presents a mottled appearance, darkish green alternating with light green. Here and there, clustered together, more particularly on the upper surface of the left lobe, are several dull white patches, not raised above the surface. On section, these patches seem to be composed chiefly of thickened peritoneum, and the liver substance beneath is whiter and denser than in other parts; nothing noteworthy

on the under surface of the right and left lobes. Pus present in the bile channels throughout the whole of the liver. Gall-bladder enlarged and its walls considerably thickened. There is a sacculus off one part, as if a stone had been lodged there; the cystic duct appears dilated, but its opening into the common bile duct cannot be easily found. Both arms of the hepatic duct are much dilated, as also is the hepatic duct itself. At the junction of the hepatic duct with the cystic duct there is a large mass, about the size of a walnut, of new growth. Its attachments to the walls of the duct are very considerable, and there are several nodules springing (independently of the main mass) from the duct walls.

The common bile duct rapidly becomes smaller in size beyond the cancerous mass, and the pancreatic duct and common bile duct open into the duodenum by separate orifices.

Microscopically, the growth was found to be a cylindrical epithelioma.

CASE 10. *Cholecystotomy for dropsy of gall-bladder, due to obstruction by gall-stones.*—Mrs. C., æt. forty-one, was admitted to the infirmary, March, 1889, on account of a tumour in the right side of the abdomen, which had been noticed

rather more than a month, although she had had dragging pain, accompanied by nausea, whenever she exerted herself, for about six months.

She gave the history of having had frequent attacks of "spasms," more or less severe, for several years. Although her general health was not seriously impaired, she said she was quite unable to perform her household duties on account of the dragging pain.

There was no jaundice, and no history of her having had an attack.

The tumour, which was about the size of a swan's egg, oval, smooth, and slightly tender, moved up and down during respiration, and could be moved from side to side for several inches. A diagnosis of distended gall-bladder containing gall-stones was made, and operation advised.

March 28.—Cholecystotomy was performed, and after several ounces of straw-coloured fluid mixed with pus had been withdrawn, fourteen faceted gall-stones were removed from the cystic duct, the largest being the size of a small walnut, the smallest the size of a pea. Exploration within the duct by means of a long probe, and outside the duct by the finger in the

abdomen, failed to discover any further obstruction. A drainage-tube was inserted into the gall-bladder after the cut edges had been sutured to the skin. Bile appeared on the dressing on the following day, the drainage-tube was removed on the sixth, and the sutures on the eighth day.

No bile was discharged after the ninth, and the wound was perfectly healed on the thirteenth day after operation. The patient returned to her home well on the seventeenth day.

CASE 11. Frequent attacks of biliary colic; no tumour; removal of forty-two gall-stones; cure.—Miss H., æt. thirty-two, consulted me two years ago on account of attacks of so-called "spasms," which had distressed her frequently for six years. She had never been jaundiced, and until I saw her she had no idea of the nature of her disease, although she had frequently sought advice.

An examination of the faeces, made at my request, after a rather severe seizure, resulted in the discovery of six faceted gall-stones. Despite careful dieting, the administration of Carlsbad water, and other treatment, the attacks recurred as frequently as before; and as her later seizures had not resulted in the passage of cælesti, I suggested that there must be one or more large

stones which could not pass; I therefore urged what I had previously mentioned as advisable: namely, that she should undergo an operation. Dr. Clifford Allbutt and Mr. Wheelhouse saw the case with me and gave the same advice.

On May 2nd I performed cholecystotomy, and removed forty-two gall-stones from the gall-bladder and cystic duct, the sizes varying between a No. 4 shot and a bean.

The suturing of the gall-bladder in this case is worth noticing, as I think the method may be of service in preventing a permanent fistula. The serous coat of the gall-bladder was sutured to the parietal peritoneum and the mucous coat to the aponeurotic layer of the abdominal wall, thus leaving the skin and subcutaneous tissue free to granulate and close the opening. The gall-bladder contained about two drachms of bile.

The drainage-tube was removed on the fourth day and the sutures on the sixth.

The temperature and pulse were normal throughout, and the patient was up at the end of a fortnight. A little bile was discharged through the fistula for six weeks, when it closed.

The patient has since been quite well, and has had no recurrence of pain.

CASE 12. *Cholecystotomy for cholelithiasis; no tumour; removal of seventy gall-stones.*—Mr. H., æt. fifty-five, residing in Cumberland, was brought to see me by my friend Dr. Black, of Harrogate. He gave the history of having suffered from frequent and severe attacks of "spasms" for seven years. The attacks, which were usually so severe as to require the subcutaneous injection of morphia before relief could be obtained, were frequently followed by jaundice. During the past year the seizures had become so frequent that the patient said his life was scarcely worth living at the price. He had never been able to discover any gall-stones in the motions.

On examination in July, 1889, he had just recovered from an attack, and was slightly jaundiced. The liver seemed to be a little enlarged, but no distinct tumour could be felt. Cholecystotomy was advised, as he had apparently tried all the usual remedies, including a course of treatment at Harrogate.

On September 7, 1889, cholecystotomy was performed. On opening the abdomen through the upper part of the right linea semilunaris, the viscera were found to be matted together, and the gall-bladder could not be seen, but could be felt

as a hard lump lying under cover of the liver, with the omentum adherent over it.

With a little difficulty, the adherent omentum was separated, exposing a shrunken gall-bladder lying very deeply ; this was incised, and from it and the cystic duct were removed about seventy gall-stones, varying in size from a No. 5 shot to that of a small bean, the larger stones being impacted the farthest down the duct.

By packing with sponges the soiling of the peritoneum was prevented. With some considerable difficulty the parietal peritoneum was tucked down and sutured to the serous coat of the gall-bladder, the mucous membrane being stitched to the abdominal aponeurosis. A drainage-tube was introduced into the gall-bladder, and the rest of the wound brought together by silk sutures.

Bile appeared on the dressings on the third day, from which time it flowed freely until the beginning of the third week, when it gradually ceased. Recovery was uninterrupted, and Mr. H. returned home a month after the operation, there being only a button of granulations over the site of the wound. He had had no pain since the operation, and said that he felt in better health than he had done for many months.

In July, 1890, a year after operation, Mr. H. had gained nearly a stone in weight, and was in excellent health.

In August, 1891, after some irregularities in diet extending over the previous year, some of the old symptoms began to be felt as if a gall-stone might be forming again, and in September one was parted with, giving complete relief; since which time Mr. H. has been again in his usual good health.

CASE 13. Cholecystotomy for cholelithiasis; no tumour; three gall-stones removed.—Mrs. A. W., æt. forty-one, was sent to see me by my friend Dr. Swann, of Batley, with a view to the performance of cholecystotomy, as the patient had been suffering for twelve months from frequent attacks of "spasms" followed by jaundice, after one of which attacks faceted gall-stones were found in the motions. For some years there had been occasional attacks of "spasms," unaccompanied by jaundice.

On September 26, 1889, cholecystotomy was performed and three gall-stones were removed, the gall-bladder being drawn up and stitched to the surface. Bile commenced to flow from the time of the operation. The drainage-tube was removed on the third

day, and the sutures were taken out on the seventh.

The patient recovered without a bad symptom, and the discharge of bile gradually diminished.

Some months afterwards the patient was in good health, and had had no return of her old symptoms.

CASE 14. *Cholecystotomy for cholelithiasis; no tumour; twelve gall-stones removed.*—Mrs. F., æt. thirty-four, was brought to see me by my friend Mr. Gerald Coleman, of Hemsworth, on September 10th, 1889, with the history that she had been suffering from gall-stone attacks since October, 1881, and that during the first six months of the present year she had had no less than fifty-eight different seizures, the greater number of them having been followed by jaundice. In four years she had lost two and a half stones in weight. On two separate occasions she had resided at Carlsbad, and had undergone the regular course of treatment, with no material benefit.

On examination, no tumour could be felt, but as the symptoms were so clearly due to gall-stones, operation was advised.

On October 10th, 1889, cholecystotomy was performed, and a small gall-bladder, no larger

than the last joint of the thumb, was discovered, lying deeply below the margin of the liver, and stones could be distinctly felt through the walls of the cystic duct. The gall-bladder was therefore incised, and twelve gall-stones were removed. The finger passed outside the duct as far as it would reach, and a probe passed inside failed to discover other concretions. Now came the difficult part of the operation, for it seemed to be almost impossible to shut out the peritoneal cavity. This, however, was accomplished at the upper part, by bringing down the parietal peritoneum, and suturing it to the upper border and sides of the wound in the gall-bladder; but the lower part of the opening it was found impossible to occlude in this way, as, owing to the depth and the friability of the gall-bladder, the slightest strain on the stitches caused them to tear away.

I therefore seriously contemplated having to perform cholecystectomy, but a piece of omentum bulging into the lower end of the wound suggested to my mind another plan, and that was to use the omentum as a plug, by stitching it around the wound in the gall-bladder and to the parietal peritoncum, after the drainage-tube had been introduced into the gall-bladder. By

this means the general peritoneal cavity was completely shut off, and the rest of the wound was closed by catgut sutures.

From the time of operation all pain ceased, and the patient's skin began to lose its icteric tinge.

The temperature never exceeded the normal, and the wound, except the drainage opening, healed by first intention, and that closed within the month ; within three months Mrs. F. gained nearly a stone in weight, by which time also her normal colour had returned.

CASE 15. Cholecystotomy for distended gall-bladder, due to blocked cystic duct; two large gall-stones removed.—Mrs. H., æt. thirty-two, was sent to me on December 19th, 1889, by Dr. Fairbank, of Deneaster, the history being that the patient had suffered for ten years from attacks of "spasms," the seizures being occasionally so severe as to produce unconsciousness, and at times coming on as frequently as daily or every second day.

She had been confined three months before she saw me, and soon after the confinement a tumour was noticed on the right side of the abdomen, beneath the costal margin, which had given considerable pain, although there had

been no repetition of the "spasms" after the formation of the tumour.

On examination, a distended gall-bladder about the size of a large pear could be felt, which was tender on pressure. There was no jaundice. A diagnosis of gall-stones was made, and cholecystotomy advised.

On January 16th, ether being the anaesthetic, the abdomen was opened by a vertical incision of two and a half inches at the upper end of the right linea semilunaris. Two ounces of opalescent fluid were removed from the gall-bladder by aspiration; it was then opened, and two gall-stones of the shape shown in Fig. 12, B, were removed from the cystic duct: the one farthest down the duct had a rounded extremity, its removal being effected by forceps placed within the duct, and by the fingers of the right hand grasping the duct and working the stone forward.

The edges of the gall-bladder were sutured to the peritoneum and aponeurosis, and a drainage-tube was inserted into the gall-bladder, the remainder of the wound being closed by ordinary sutures. Bile commenced to flow before the operation was finished. The drainage-tube was removed on the third day, and the wound healed

by first intention, the patient returning home cured at the end of the third week.

A year afterwards the patient was well, and had had no return of her symptoms.

CASE 16. *Cholecystotomy; removal of one large gall-stone.*—Mrs. G. T., aged forty-two, after recovering from the operation in 1888 for absence of the liver dependent on gall-stones, two of which were removed, remained in good health for a year, when she began to suffer from occasional attacks of pain over the situation of the gall-bladder, and a minute opening developed in the cicatrix left by the former operation. This discharged clear mucus from time to time, and then she was relieved, but when it healed she began to have discomfort, and at times rather severe pain.

She was admitted to the infirmary in February, 1890, and on the 14th, under ether, the small fistula was enlarged and extended by incision, and a gall-stone the size of a small walnut was seized with forceps and extracted. The peritoneal cavity was not opened, as the gall-bladder was surrounded and completely shut off by adhesions. A small drainage-tube was inserted into the gall-bladder, and two or three sutures served to close the incision. She made

an uninterrupted recovery, without rise of temperature, and left the hospital on March 1st, the wound being almost healed. There was no discharge.

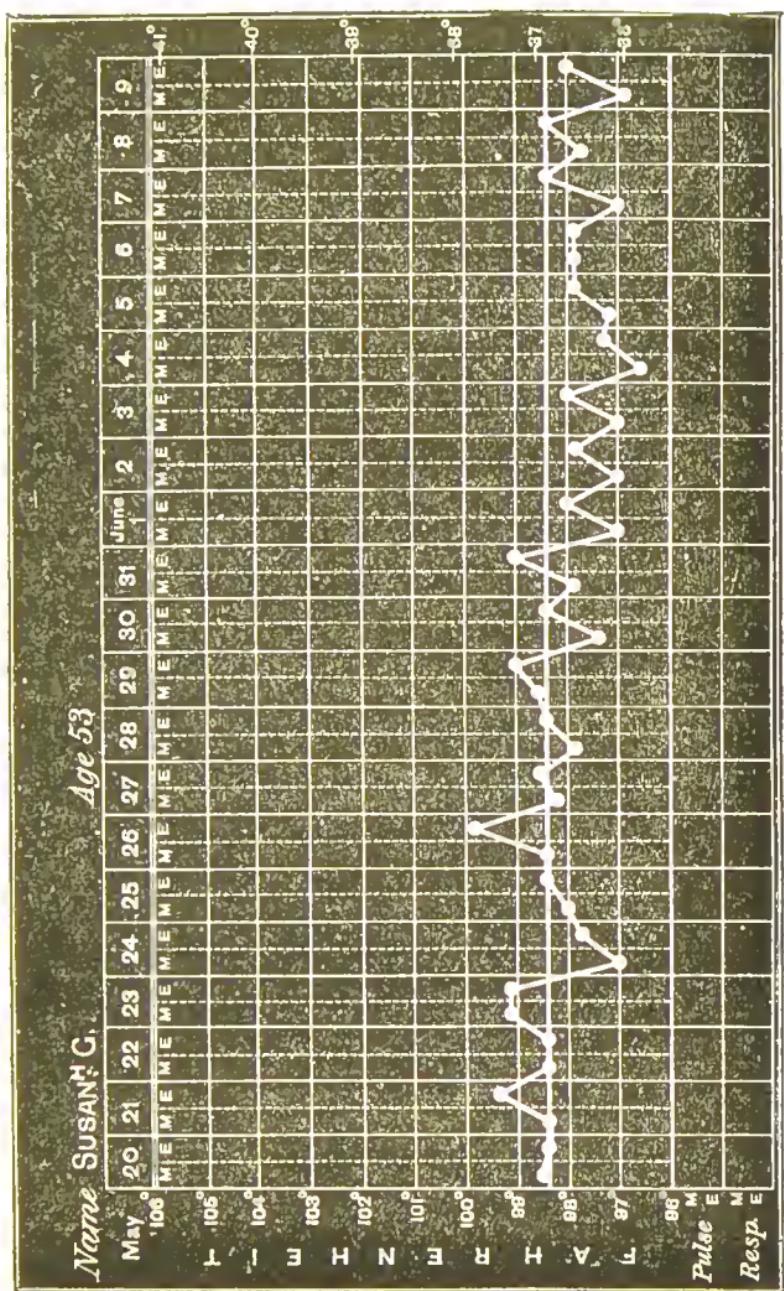
When last seen in May, 1891, there was a small fistula, discharging a few drops of clear mucus, but the patient was quite easy, and did not think it needful to have further treatment.

CASE 17. *Cholelithiasis without tumour; removal of a solitary gall-stone.*—Mr. R., aged fifty, was sent to me by my friend Dr. Britton, of Harrogate, in April, 1890. He gave the history of having been perfectly well up to June, 1889, when he had a severe attack of pain in the region of the liver, which lasted for several days, but which was not followed by jaundice. He had no further attack until November, and between November and Christmas he had five similar seizures. Between January and his seeing me in April he had had seven attacks, only once having been slightly jaundiced, the yellowness of the eyes then only lasting three days. Having very little doubt that the attacks were due to gall-stones, we had the motions carefully examined, and on May 5th, although there had been two attacks since Mr. R. saw me in April, no gall-stone had been found, although

carefully searched for. It was thought that during the attacks of pain a swelling had been noticed on the right side of the abdomen, but this point was not very definite, and when I saw Mr. R. there was an entire absence of physical signs. Cholecystotomy was recommended, and performed on May 6th, when one gall-stone, the size of a cherry, without any facets, was removed from the gall-bladder. Bile flowed at once, and the drainage-tube was removed on the third day, the stitches being taken out on the eighth. At the end of a fortnight the wound had quite healed, and Mr. R. returned to his home at the end of three weeks. He has remained quite well since, and is now in perfect health. The interest in this case lies in the fact that all the symptoms were dependent on the one calculus.

CASE 18. *Cholecystectomy*.—Mrs. S. G., aged fifty-three, was admitted on May 9th, 1890.

Cholecystotomy had been performed on August 29th, 1888, when sixty-six gall-stones were removed and the gall-bladder was drained. In March, 1889, she reported herself as feeling very well, and as having been free from attacks of pain. The cicatrix seemed firm, but she said it had discharged from time to time a little clear fluid from a minute aperture. Early in 1890



0—30

Fig. 16.—Temperature Chart of Case 18.

she again reported herself, and said that the fistula had now and then become blocked, and ceased to discharge. When this had occurred she had suffered from continual pain in the right side until the discharge commenced again. She had been slightly jaundiced three times since the operation, each time following on the stoppage of the fistula.

When admitted, in May, 1890, there was a fistula in the old scar sufficiently large to admit a fine probe.

Under *chloroform*, the sinus was first enlarged and the gall-bladder explored. It was empty and contracted. At the neck of the bladder was a very tight stricture, through which even a fine probe could not be passed. The opening in the abdominal wall was then extended, making an incision three inches in length, and the adhesions of the gall-bladder to the parietes were separated.

Nothing could be felt in the cystic or common duct. The gall-bladder having been completely isolated, a ligature was passed round its neck and the bladder removed.

The edges of the peritoneum were then stitched over the stump, the cavity was sponged

out, and the incision was stitched and dressed antiseptically.

After the operation the patient had a good night, and slept well. She passed flatus on the following morning. Later in the day she had a great deal of pain, which was relieved by morphia. See temperature chart (Fig. 16).

She then made an uninterrupted recovery. The wound healed by first intention. She went home on June 19th, quite well. When seen some months later she was in excellent health.

CASE 19. Cholecystotomy with Cholelithotripsy.
—Mrs. C., æt. thirty, consulted me in January, 1890, on account of what she supposed was indigestion, as she suffered from frequently recurring attacks of pain in the region of the stomach and on the right side of the abdomen, the pain being worse after food, and often accompanied by sickness. These symptoms had been present more or less for a year, during which time she had also had attacks of "spasms" ending in sickness. She said that in April of 1888 she had had congestion of the liver, accompanied by severe pain, and that then she was in bed for about a fortnight; that in November, 1889, after a severe attack of pain, she had become jaundiced, the jaundice never having

completely disappeared, although it was worse at times; and that during the past two years she had lost two stones in weight.

On examination, a tumour could be distinctly felt below the right costal margin, and as the kidney could be felt behind it, and the tumour could be traced to the neck of the gall-bladder, and was felt to move with the liver, a diagnosis of distended gall-bladder was made, the history pointing to gall-stones as the cause.

As the patient was continuing in pregnancy, it was felt that if operation could be deferred it might be wise to do so, although it was manifest that ultimately operative measures would be called for.

In February she had two severe attacks of pain, followed by increase of the jaundice, and the attacks were repeated pretty frequently up to the end of April, when she miscarried.

I was asked to see her again at the end of May, she being then distinctly jaundiced. I then urged operation, which was performed on June 3rd, 1890, the anaesthetic being ether. The gall-bladder was opened, and found to be empty, but the common duct was crowded with calculi, which were crushed by means of padded forceps. A drainage-tube was then inserted, and

the edges of the wound sutured to the skin by interrupted sutures. Bile soon commenced to flow, and the drainage-tube was left in for a fortnight, the rest of the wound healing by first intention.

As the motions remained colourless, and a permanent biliary fistula was to be feared, hot water was injected into the gall-bladder night and morning for a few minutes at a time, in the hope that the crushed fragments might be displaced.

The patient was up at the end of three weeks, and in good health. She gained weight and colour, lost the jaundice, and was very well except for the fistula, which after a month only discharged a little bile daily, the motions being decidedly bile-stained.

As the small fistula showed no signs of closing, I decided to try the effect of a solvent injection. I therefore dissolved a few drops of turpentine in ether, and injected this through the minute fistula into the gall-bladder; the effect was to produce very acute pain, lasting for some little time, but the result was excellent, since the fistula completely closed, and the motions assumed their proper colour. The patient has continued perfectly well since.

CASE 20. *Cholecystotomy for gall-stones, performed on the strength of symptoms, without physical signs.*—Mr. B. P., aged twenty-nine, residing at Wyke, near Bradford, was sent to see me by my friend Dr. Dearden, in June, 1890, when he gave the following history:—He had been quite well up to twelve months ago, when he was seized, whilst at work, with a sudden attack of severe pain on the right side of the abdomen, just below the ribs, which compelled him to return home. The attack lasted for several hours. No jaundice followed, and he was able to return to his duties in a day or two. Ever since that time he had been subject to similar attacks, but on no occasion had he been jaundiced, and he had never noticed any swelling in the region of the liver. The attacks did not recur periodically, he having had once an interval of a month without an attack, whilst on other occasions he would have several in a week. On several occasions the spasms had come on when he was in bed. The attack which he had just previous to admission lasted six hours. At no time had the motions been clay-coloured or the urine specially dark. He was admitted to the infirmary on June 6th, in order that he might be watched for a time;

but beyond having several attacks of pain of a similar character, no physical signs were noticed. On June 19th cholecystotomy was performed. The gall-bladder was found to be small, and lying well under cover of the liver. One gall-stone was found loose in the gall-bladder, and five others were removed from the cystic duct by means of forceps within, aided by fingers on the outside of the duct. The gall-bladder was so far from the surface, that the lower edge of the incision could not be brought to the parietal peritoneum, hence the omentum was made use of to shut out the general peritoneal cavity. This was effected by bringing up the right border of the omentum, stitching it to the incision in the gall-bladder, and then to the parietal peritoneum. A drainage-tube was inserted into the gall-bladder, and bile commenced to flow as soon as the operation had been completed. On June 25th the drainage-tube and sutures were removed. On July 4th the discharge had diminished considerably. On the 12th the wound had almost healed, and on the 26th it had perfectly closed. The patient was seen in September, when he was looking and feeling perfectly well, and said that he had not had an attack of pain since the operation.

CASE 21. *Exploration for gall-stone.*—Mrs. B., æt. forty-two, residing at Scholes, had suffered from jaundice for a year, the jaundice having come on after a severe attack of pain in the region of the liver. Since the first attack the skin had never been entirely free, but the jaundice had always been worse after the attacks, which had usually been accompanied by a feeling of chilliness or a rigor, followed by heat and perspiration, very much like ague.

I saw the patient, on June 22nd, with Dr. Sykes, of Cleekheaton, who had asked me to come prepared to operate, when I found considerable enlargement of the liver and a feeling of fulness below it, with very marked tenderness.

The patient was at the time very much pulled down, having just passed through a severe attack, which had been followed by persistent vomiting.

The usual incision was made, when the gall-bladder was found shrunken, and quite small under cover of the liver, the stomach, omentum, and colon being very adherent. A mass was felt behind these adhesions in the situation of the common duct or of the head of the pancreas, but it was felt that it would be imprudent to proceed further, as the adhesions were

too firm to be broken down, and the patient was in a very unfit condition to bear a prolonged operation. After all bleeding had been arrested, the layers of the abdominal wall were sutured separately and no drainage-tube was employed.

The patient made an uninterrupted recovery and from that time was entirely freed from her pain. I received a report a few months afterwards to say that she was apparently quite well. I suspect, therefore, that the manipulations in attempting to undo the adhesions had forced on the gall-stones, and so relieved the obstruction.

CASE 22. Cholecystotomy, removal of gall-stones, and evacuation of abscess of liver, also containing gall-stones.—Mrs. J. E., aged twenty-five, was admitted to the Leeds General Infirmary on Sept. 25th, 1890, with the following history:— She had had occasional attacks of “spasms,” with intense pain across the epigastrium and in the back, for fifteen years. She was frequently having abdominal pain, accompanied by nausea and occasional vomiting; but being delicate, it was not considered to be anything more than “colic.” Her first characteristic symptoms commenced five months previous to her admission, when she was seized with intense

abdominal pain in the right hypochondriac region and persistent vomiting, which continued, with slight intermissions, for thirty-six hours. She was ill in bed a week after this, with constant gnawing pain in the right side and occasional vomiting; at the end of the week she passed a quantity of dark green fluid from the rectum, and her symptoms abated. She had two similar, but less severe, attacks three months later. She had never been jaundiced; she never looked for gall-stones in the faeces. When admitted, her condition was as follows:—

Thin face, with a pale sallow complexion. No jaundice. Evident pain and tenderness over the right hypochondrium. There was a slight fulness just below the margin of the ninth costal cartilage on the right side, one inch internal to the nipple. This swelling moved up and down with respiration, and was manifestly tender. She had noticed this swelling herself, and said that it varied in size, decreasing after the discharge of fluid from the rectum, and giving her pain in proportion to its size. Liver dulness commenced in the fourth intercostal space, and extended downwards to within an inch of the level of the umbilicus. Faeces rather pale in colour. No albumen in urine.

On Oct. 2nd, under ether, the abdomen was opened by an incision a little to the right of the middle line, commencing at the lower border of the ninth costal cartilage. The gall-bladder was found with the adjacent viscera matted round it. The gall-bladder was opened and a number of gall-stones removed. It was then found that a number of gall-stones were lying in a cavity in the liver substance itself, having evidently ulcerated through from the gall-bladder. This cavity was opened up and cleared out. In all, thirty-eight gall-stones were removed. A good deal of semi-purulent fluid escaped from the cavity. After thorough irrigation of the cavity, it was attempted to stitch the gall-bladder to the abdominal wall; but as it was found to be impossible to effect this and to completely shut off the peritoneal cavity, a fold of omentum was drawn up and stitched to the gall-bladder and to the edges of the incision, thus completely occluding the peritoneum.

A tube was inserted and an antiseptic dressing applied. After the operation the patient had a bad night, vomiting and suffering much pain. Everything by the mouth was therefore stopped, and the patient fed per rectum. After this the vomiting ceased, flatus

passed, and at the end of two days a little milk and soda-water was given. She steadily improved up to the sixth day, when she had some diarrhœa. This was checked by a little morphia. The wound discharged small quantities of slightly bile-stained fluid. A week later she had an attack of pelvic inflammation, which pulled her down a good deal and proved very obstinate. The wound had then nearly healed. She left the hospital on the 28th of November in good condition, except for an occasional rise of temperature at night. The wound had then healed. She was heard of some months later, and was said to be quite well.

CASE 23. *Cholecystotomy, with removal of gall-stones, and cholelithotripsy.*—Mrs. H., æt. 30, residing in Sunderland, was seen by me at the request of Dr. Squance, who wrote to me on September 23, 1890, saying that his patient was suffering from repeated attacks of biliary colic; two gall-stones had been found, and fragments of others. Dr. Squance had recommended her to try treatment by massage, etc., at Harrogate, and to consult me as to the advisability of operation, but as the attacks were recurring so frequently, he feared she would be unable to travel. A letter a few days afterwards stated that “the

attacks are succeeding each other very rapidly now. About a month since, I feared she would die from exhaustion, as she suffered from the most distressing vomiting for ten days, during which period nearly everything was rejected, her nutrition being carried on by nutrient suppositories and peptonised milk enemata. There is no enlargement of the gall-bladder to be detected, nor is there any increase in the size of the liver. Jaundiee has been present slightly on one occasion. The temperature has been normal or sub-normal, with the exception of three or four days, when there was slight local peritonitis."

On the 1st of November Dr. Squance wrote to me to say that the treatment by massage had resulted in the passage of a gall-stone with subsequent improvement, which, however, was not kept up, as about three weeks ago constant vomiting had set in, accompanied by a dull aching in the right hypochondrium.

The patient was seen by Professor Oliver, who agreed with Dr. Squance that choleecystotomy ought to be done.

On November 5th I saw Mrs. H. in Sunderland with Dr. Squance, when she had a pulse of 120, and seemed so prostrate and ill that I feared she would scarcely survive the operation. There

was then a slight trace of albumen in the urine, which had a sp. gr. of 1015. The liver did not seem abnormally large, and no tumour could be felt in the region of the gall-bladder. The patient was free from jaundice.

On the following morning cholecystotomy was performed, Mr. Littlewood assisting me. The gall-bladder, which was small and shrunken, was opened, and one gall-stone removed; several were felt low down in the cystic duct, and were crushed by means of guarded forceps placed outside the duct, and the fragments passed onward.

With difficulty the parietal peritoneum was sutured to the cut edges of the gall-bladder and a drainage-tube inserted.

On November 7th I received a note to say that Mrs. H. had only vomited twice since the operation, that bile had come freely through the drainage-tube, and that the wound looked very well.

After this there was a return of the sickness, and the wound gave way to a certain extent, which retarded convalescence; but thanks to the careful treatment of Dr. Squance, the patient made a good recovery, and in July, 1891, I was informed that she was in good health, and had had no return of the symptoms.

CASE 24. *Cholelithotropy*.—Mrs. E. W., at forty, sent to me by Dr. Purdy, was admitted to the Infirmary, November 6th, 1890. The patient had a severe attack of pain eleven years ago, starting in the right hypochondrium, and shooting round to the front of the abdomen and backwards to both scapular regions. The pain, which was of a deep-seated gnawing character, was very severe, and caused the patient to be quite helpless and prostrate, doubled up in bed, vomiting and sweating profusely. After this she had repeated attacks, sometimes with only a few days' interval, and sometimes being quite well for several months. The attacks lasted from five to twelve hours, and usually ceased quite suddenly. The urine was scanty and high-coloured after an attack. She had never found any gall-stones in the motions. Two days before admission she had a very severe attack, lasting thirteen hours, after which she was slightly jaundiced for the first time.

On admission, there was slight discolouration of the conjunctiva; no enlargement of the area of liver dulness, and no perceptible enlargement of the gall-bladder. The abdomen was very tender in the right hypochondriac region. There was nothing abnormal about the chest or in the urine.

On November 14th, under ether, the abdomen was opened in the right linea semilunaris, opposite the tenth rib. The stomach and intestines were found to be intimately adherent to the under surface of the liver, and were only separated with great difficulty. In the position of the gall-bladder was found a hard cicatrical mass: evidently the remains of a much-contracted gall-bladder and cystic duct, but not containing any gall-stones. Impacted in the common duct, a single stone was found, about the size of a blackbird's egg. This was crushed between the finger and thumb, the former being passed into the foramen of Winslow, the latter in front of the duct. The abdomen was then closed with silk sutures.

November 15th.—Had a great deal of pain and vomiting during the night. All liquid by the mouth stopped, and patient fed entirely by the rectum. After this the vomiting became much less frequent, but the patient continued retching. On November 17th she vomited again more frequently, the vomit having a distinctly faecal odour; the patient was therefore kept slightly under the influence of morphia, given hypodermically. From this time she steadily improved, all vomiting ceased,

and on November 20th she was practically convalescent.

On November 22nd the wound was dressed; it had not healed by first intention, probably in consequence of the incessant movement due to the vomiting. She steadily got well, and went home on December 23rd. A few small fragments of gall-stones were found in the motions a week after the operation.

When last seen, in June, 1891, she said she had never been so well for twelve years.

CASE 25. *Cholecystotomy; removal of gall-stones.*—Mr. R., at thirty-nine, residing in Newhaven, Conn., U.S.A., came to see me in July, 1890, and was so good as to give me his history in writing, which I here insert.

“In 1883-4 I suffered a good deal from a very bad intestinal action, showing itself in pains and soreness, but especially in a diarrhoea, in which the motions were of a very bad character, being of an unnatural appearance and of a very bad odour.

“In winter my health seemed to be much better than in summer.

“In 1885 I several times suffered from nausea and vomiting immediately after dinner.

“In 1885, early in the fall, I had the first

attack of what was evidently the passage of a gall-stone, or an attempt to pass one.

"On the day previous I had been travelling, and was very much chilled, and had eaten very irregularly and injudiciously. The attack commenced in the morning, about six or seven o'clock. There seemed to be a sense of fulness just below the ribs, more on the right side than on the left; there was not a pronounced pain, but an agony of distress, which seemed as though some passage was stopped which ought to be open. The distress was extreme, and I was hardly able to breathe. I was very cold, and the perspiration ran down my face and dropped off my chin. The attack lasted two or three hours.

"The physician who was called thought it might be gall-stones. I do not know that any passed at that time.

"During the next six or eight months I had six or eight attacks; one of them was followed by a persistent constipation, which I thought might have been caused by some hypodermic injections of morphia, which were given me to relieve my distress.

"Usually I thought I could trace the immediate cause of the attacks to some indigestion,

caused or aggravated by some injudicious eating, within twenty-four hours of the attack.

"The first attack had none of the cutting, burning, or lacerating sensations which some persons have described as taking place during the passage of gall-stones, but some of the later attacks were more of that character, especially towards the latter part, and I could frequently tell when an attack was nearly over, by a feeling that whatever had caused the trouble had moved, and was making its way into the intestine.

"In the spring of 1886, after several attacks had occurred, I was left with a feeling of soreness just below the ribs on the right side, and was very weak and depressed for a long time. During the summer I gradually improved in health, and from 1886 to 1889 I had none of the attacks, although my health was not very good.

"In the fall of 1889 the attacks re-commenced, and I had one, on the average, once a month or oftener, increasing in severity.

"The pain in some of these attacks was such that it seemed as though the calculus or inspissated bile which was causing the pain was passing through the duct, and I could frequently tell, as in 1886, when an attack was nearly over, by the pain seeming to pass along

toward the middle of the body, it being of a burning, sharp character, instead of producing the dull distress which it did when it first commenced.

"These attacks were many of them extremely severe, but some palliation was derived from the application of cloths wrung out of very hot water.

"Hypodermic injections of morphia relieved the pain, but were liable to cause a recurrence of it by causing constipation, unless corrected by the taking of some aperient about the same time.

"I found it necessary to keep the bowels open, or an attack was liable to occur at any time. I had also to be very careful about diet.

"I found acidity of the stomach was prevented to a considerable extent by the use of Viehy water, especially by an artificial viehy charged with carbonic acid gas, like soda-water.

"In March, 1890, I had a severe attack of another character. I had not the feeling of tension and stoppage which I had sometimes suffered from, but an intense and persistent aching, something like toothache, located immediately below the ribs on the right side, three or four inches from the median line. It lasted all night, and in the morning I was very weak and prostrated.

"I remained very weak for about two months, after which I improved, and in May and June was feeling pretty well. In the latter part of June, however, I began to feel worse, and on the 2nd July had two more severe attacks, but not lasting more than an hour each. These were excited at the time by riding in a carriage less easy than I had been accustomed to.

"On the 16th of July I went to England to consult physicians and surgeons concerning the trouble; found the voyage very beneficial, also the change of climate. I returned in September, but during October had another attack of the same character as that experienced in March, but seemed to recover strength after it sooner.

"November 1st, went again to England; was benefited by the voyage, but within ten days of landing had another attack of pain, and had them occasionally until the operation on the 24th of December.

"During 1890 I consulted many of the leading surgeons and diagnosticians on both sides of the Atlantic, but their diagnoses and advice differed very widely, some saying that I had no gall-stones at all, and the majority opposing operation as too hazardous."

When Mr. R. saw me in July there was no

jaundice, and I could find no physical signs of enlargement of the gall-bladder, but after a careful consideration of the history, I had no hesitation in making a diagnosis of cholelithiasis, and in advising cholecystotomy ; and as the attacks were recurring frequently, and the patient had lost weight considerably, I advised that it should be done without much delay.

As Mr. R. had been advised by several eminent physicians to try Carlsbad and other medical treatment before resorting to surgical means, operation was deferred ; but on October 6th I received the following letter :—“ Your prediction as to my having continued aches and pains has proved better than the hopes I had cherished that I might be as comfortable ashore as I was on the ship. I have had tenderness and aching much of the time, and last Monday and Tuesday had some of those severe pains which necessitate the use of morphia to overcome. The attack resembled that of last March, but has not left me so weak as that. It appears I shall not be of much use until those irritating things are taken out, and I think I shall sail for England as soon as possible after receiving a cable answer to this letter, to say whether you expect to be at home through November.”

On December 29th I performed cholecystotomy, my esteemed colleague, Mr. Wheelhouse, being present at the operation, Mr. F. H. Mayo immediately assisting, and my brother administering ether.

The abdomen was opened in the right linea semilunaris, the incision being about three inches in length. On opening the peritoneum, the omentum was found adherent to the under surface of the liver, from which it was separated. Beneath this, the stomach, transverse colon, and gall-bladder were found attached by old adhesions, which were also separated. The gall-bladder was found shrunken and hidden away under cover of the liver, and through its walls could be felt a number of gall-stones, which could also be traced along the cystic duct. The gall-bladder was opened, and about a teaspoonful of fluid, somewhat resembling pus, escaped, but this was probably altered mucus. A considerable number of gall-stones was extracted, some of them being crushed in the process. The distal end of the cystic duct was then easily cleared, but as far as the finger could reach was felt a gall-stone about the size of a filbert, which was with difficulty extracted by means of forceps placed within the duct, aided by the fingers

without. Even then it had to be crushed before it could be altogether removed.

After the *débris* had been cleared away, both the cystic and common ducts were examined along their whole length, and found to be completely cleared of concretions. Sponge packing prevented any fouling of the peritoneum during these manipulations. As the gall-bladder was so shrunken, it was quite impossible to bring it to the surface, but by tucking down the parietal peritoneum, the serous layer of the gall-bladder and the margin of the parietal peritoneum were satisfactorily sutured, and a drainage-tube was inserted. The remainder of the wound was closed in the usual way.

The after-progress was without any unusual incident; bile commenced to flow on the second day, and the tube was removed on the fourth. The wound had perfectly healed in the third week, and when Mr. R. left Leeds for America, in the fourth week, there was only the scar to indicate where the operation had been.

In January, 1892, I heard from Mr. R. to the effect that he was in good health, and that he had had no repetition of his former attacks.

CASE 26. *Cholecystotomy; gall-stones; jaundice; malignant disease.*—Mrs. J. R., aged

forty-five, a patient of Dr. Hollings, of Calverley, was admitted on December 29th, 1890, suffering from intense jaundice with haemorrhage from the uterus and the bowel, and in a very exhausted condition.

The history was as follows: five weeks prior to admission she was suddenly seized with intense pain in the right hypochondrium, radiating downwards towards the umbilicus and upwards to the right shoulder. This was accompanied by profuse sweating, vomiting, and prostration. The attack lasted several hours. Next day she was slightly jaundiced, but otherwise well. Ten days later she had a similar attack. Since that time she has had repeated seizures of the same nature occurring within periods of a few days. Each attack seemed to intensify the jaundice.

During the ten days prior to her admission she had haematemesis, melæna, and a petechial eruption over the body. No gall-stones had been found in the faeces.

On admission, her condition was as follows: body thin and wasted, and most intensely jaundiced. She was dull, partly stupefied, and very feeble. Pulse 120; temperature 100°. No enlargement of the area of liver dulness. No evident enlargement of the gall-bladder.

Complains of slight pain about the right hypochondrium. Petechial spots about the body. A little bloody discharge from the vagina. She passed about two ounces of blood-clot from the rectum shortly after admission.

On December 30th, in the hope of relieving the jaundice, an incision was made at the tip of the tenth costal cartilage on the right side. The operation was rendered very tedious, as every small vessel in the incision had to be ligatured. On opening the abdomen, the gall-bladder was found packed with calculi and fixed by adhesions. After inserting flat sponges, the gall-bladder was opened, and thirty-three gall-stones were removed. The ducts were next explored with the finger. Several nodules could be felt along the common duct, the lower end of which seemed to be surrounded by a hard mass in the head of the pancreas. No time was lost in stitching the gall-bladder to the abdominal wall. A tube was inserted to drain the gall-bladder, and the wound packed with small sponges to control the oozing.

After the operation the patient rallied well, but at the end of two hours the pulse failed rapidly, a quantity of blood-clot was passed per rectum, and she died the same day. A. C. E.

was the anaesthetic used. At the post-mortem examination a mass of malignant disease was found in the head of the pancreas. One gall-stone was found in the common duct. There were haemorrhages found in several parts of the body.

CASE 27. *Cholecystotomy and cholelithotripsy.*

—Mrs. E. W., æt. fifty-five, was admitted on July 13th, 1891, when she gave the following history:—

Six years prior to her admission she continually suffered from pain about the right hypochondrium and epigastrium, but for twelve months she had no characteristic seizure. At the end of this period she had an attack of pain in the right side, radiating in all directions, but especially to the right shoulder, accompanied by vomiting, profuse sweating, and collapse. On the following day she was jaundiced. During the next two years she had only two attacks. She then commenced to have them with increasing frequency, and on one occasion found three gall-stones in the faeces. During the eighteen months previous to her admission she frequently had an attack every day for a week or more, and had never been more than a fortnight without pain. She had taken morphia in large doses.

On admission, beyond being very slightly jaundiced, there was nothing worthy of note.

On January 13th the abdomen was opened by a three-inch incision opposite the tip of the tenth costal cartilage. On examining the gall-bladder, two small stones could be felt just at the junction of the neck of the bladder with the duct. After inserting sponges around the gall-bladder so as to prevent the escape of bile into the peritoneum, the fundus was incised. It was then found that every attempt to remove the two gall-stones only pushed them farther into the cystic duct. A pair of forceps, with blades covered with indiarubber, were therefore applied outside the duct, and the stones were then easily crushed. The edges of the incision in the fundus were then stitched to the parietal peritoneum, a drainage-tube was inserted into the gall-bladder, and the incision in the abdominal wall closed with two or three silk sutures. The patient had no pain after the operation. The dressings were changed as often as the bile soaked through. The temperature rose to 101° on the second night, but dropped to normal on the following morning, and remained so. On the eighth day the tube was removed and the wound tightly strapped. On February 1st the wound was

quite healed. All faeces passed were sifted through muslin, and fragments of gall-stones were found. The patient went home quite well on February 17th. She has been seen once since, and says she is quite cured.

CASE 28. *Hepatotomy for hypertrophic cirrhosis, with cyst in liver; subsequent cholecystotomy for gall-stones.*—H. M. C., æt. forty-two, was admitted on November 8th, 1890. She gave the following history:—For six years she had been subject to occasional attacks of violent pain in the right hypochondrium, running forwards and downwards to the umbilicus, and upwards and backwards to the mid-scapular region. The attacks were accompanied by violent vomiting of bile-stained fluid. After the vomiting the pain usually lessened, but never ceased suddenly.

In May, 1889, the patient noticed for the first time a swelling on the right side of the abdomen about as large as a hen's egg, and projecting below the border of the ribs.

In September, 1889, the patient had a very severe attack of pain, accompanied by vomiting, which lasted almost continuously for three weeks.

In May, 1890, she had another attack, during

which diarrhoea of a dysenteric character was a marked feature. During the intervals between these attacks she seemed to have been comparatively well, and after the last seizure she remained well until August 28th, when she had a slight attack of pain and vomiting. At that time she was pregnant and expecting her accouche-
ment, being at full term. On September 2nd she was confined, the labour being normal. On September 6th she had a severe attack, and on the following day the urine was stained with bile. Two days later the child died. On the fourteenth she began to be troubled with pruritus and the faeces became clay-coloured; on the seventeenth she first noticed jaundice. Within a few days she became deeply jaundiced, and from that date the jaundice had persisted, vomiting had been frequent, but the pain less severe, only coming on for short periods, and never being very acute. She had occasionally noticed slight oedema of the lower extremities at night, but never general anasarca. She had lost flesh rapidly since her confinement.

When admitted, on November 8th, the following conditions were noticed :—

The patient was thin and wasted, and very languid and feeble.

There was general and profound jaundice; skin very harsh and dry.

There was very troublesome and distressing pruritus.

Nothing abnormal in the chest.

Faeces almost white. Urine loaded with bile.

On examining the liver area, the following was noted:—Partial dulness commenced at the fourth rib in the right and left nipple lines. Dulness was absolute at the sixth rib. The surface of the liver could be felt extending downwards on the right side into the iliac fossa, where it terminated in a well-defined edge. This edge could be traced upwards towards the umbilicus. Before reaching this point the edge was interrupted by a round globular swelling with a rather irregular surface. This swelling was sufficiently large to fill the palm of the hand. The edge then continued to the left of this swelling, and ran obliquely upwards, and was lost in the left hypochondrium. The surface of the liver was smooth and firm to the touch. No fluctuation could be felt at any point.

For the first ten days in the hospital the patient was carefully watched, but nothing worthy of note occurred. She had no pain or

vomiting. On December 16th, Dr. Chirton, who had been asked to see the case, detected fluctuation a little to the right and below the umbilicus. An aspirator needle was inserted, and six ounces of fluid drawn off. It was clear, faintly straw-coloured, with sp. gr. 1008, a trace of albumen, and abundance of chlorides. The reaction was neutral. No echinococcus hooklets could be found. After the exploration the patient improved somewhat and became a little less jaundiced. She went home at her own express wish, and returned on January 14th. Her condition, generally speaking, was the same as on the previous occasion, the globular swelling being rather more prominent, but otherwise unchanged. An exploring needle was put in, this time in the middle line, about two inches above the umbilicus. Fluid was drawn off having the same characters as that found on a previous occasion.

On February 5th, under ether, an incision two inches long was made in the middle line vertically downwards to within one inch of the umbilicus. On opening the abdomen, the surface of the liver came into view. On pushing a needle about one inch and a half into the liver, fluid was found in a cavity of apparently

considerable size. This cavity was therefore opened freely with a Paquelin's cautery. Five ounces of fluid were collected, and other two or three ounces were lost. A drainage-tube was inserted into the cavity, and the edges of the incision into the parietal peritoneum were stitched to the edges of Glisson's capsule, which was well defined. The incision in the abdominal wall was next reduced in size by means of two or three silk stitches. An antiseptic dressing was then applied. The operation was rendered tedious, as every small bleeding point had to be ligatured, on account of the jaundice. After the operation the wound oozed incessantly. First, packing with gauze soaked in tincture of hamamelis was tried, several small oozing points being ligatured; washing out with strong tincture of hamamelis arrested the oozing only for a time. On the evening of February 6th the wound was packed all round the drainage-tube with solid perchloride of iron. As often as the blood came through, the wound was wiped dry and packed in this way. On February 10th all bleeding had stopped and bile was beginning to flow from the tube. After this date, bile discharged freely from the wound, and the patient progressed favourably. The jaundice slowly

diminished in intensity for three weeks, but after this remained stationary. On March 12th the temperature rose to 103° , and there was a slight rigor, accompanied with headache, malaise, etc. This passed off, but the patient continued to look ill. The globular swelling to the right of the umbilicus had continued to enlarge; fluctuation could be felt in it indistinctly, and there was some tenderness over the swelling. As the jaundice was no longer diminishing, and this swelling was evidently the gall-bladder, slowly, but gradually, becoming more distended, it was decided to open the abdomen at this point and drain the gall-bladder. On March 18th the abdomen was opened over the swelling, which proved to be a distended gall-bladder. The bladder was first aspirated, and several ounces of mucous fluid withdrawn. It was then packed round with sponges and incised. A cubical gall-stone, measuring about three-quarters of an inch in each direction, was found in the bladder. Two other calculi could be felt in the common duct, which resisted attempts to crush them; and not yielding to moderate force, it was deemed wiser, as the patient was much jaundiced and very feeble, to leave them *in situ* for the time being,

and drain the gall-bladder. The edges of the incision in the fundus were therefore stitched to the abdominal wound and a tube was inserted. After the operation the patient somewhat improved in her condition. Bile continued to drain from the first opening, but only about one to two ounces came from the opening in the gall-bladder; the fluid was not pure bile, but chiefly bile-stained mucus. The urine improved, the bile pigments steadily diminishing. The first week in April the patient wished to go home for a time, which she did on the 11th, intending to return in a short time. Unfortunately, three weeks after going home she was attacked with influenza, and died of bronchopneumonia.

CASE 29. *Exploratory operation; jaundice; malignant disease.*—Sergt. Major T. G., residing in Chatham, wrote to me on January 29, 1891, the following account of his case:—

“ During September, 1889, I became intensely jaundiced without apparent cause. This continued for several months during which time I was treated in the military hospital. During the whole period I had no pain whatever, but suffered from intense itching. Towards the end of November of the same year I went to Guy’s

Hospital, and had only been in about three days, having undergone no treatment, when my motions and water became quite natural, and the obstruction, whatever it was, cleared off. In a week or two I was apparently well, and remained so until the beginning of October, 1890, except that in the summer I had two attacks of shivering, but no pain or jaundice. [A report from Guy's says that when he left, he was still slightly jaundiced and had a fulness over the gall-bladder.] On the 10th of October, whilst sitting at home, I was seized with a rigor, and had a sharp pain in the right side, which lasted about two hours. The next morning I noticed my urine thick, and in a few days I became jaundiced. I was treated in the military hospital for about a month, and then went to Guy's, where I had the olive oil treatment, which was continued after my return to Chatham; but it had to be discontinued, as I became so prostrate, suffering from pain and bleeding at the anus, and I could scarcely move without wanting to have a motion. Many other remedies were then tried, but without effect. About three weeks ago I was advised to consult a specialist in London, who wrote to my medical man here to the following effect:—‘I have carefully examined

your patient, and find, as you say, that he is suffering from enlarged gall-bladder on account of a concretion being firmly impacted in the common duct. Of course there is danger if the impaction be long continued, as the persistent irritation caused by the pressure of the biliary concretion is apt to produce degenerative changes in the neighbourhood. So all our efforts must be directed to getting the obstruction moved as quickly as possible; and with that object in view, I should advise you to give him the following pill, which will not only tend to keep the bile fluid, but will dilate the duct and increase the peristaltic action of the gall-bladder. But still further to help the stone being pushed through the duct, I think you had better three or four times a week apply graduated pressure to the gall-bladder, to press the bile it contains against the obstructing body, and thus hasten its movements.'

"That treatment has been carefully carried out, so far without result, and I am almost giving way to despair. During the whole of the period, however, I have suffered no pain since the attack on the 10th of October. My occupation has been of a sedentary nature, and my only foreign service has been in Canada and St. Helena—both

very healthy stations. I have lost a good deal of flesh and am becoming very weak. Under these circumstances, I venture to write and ask your opinion of my case."

From the absence of pain and the long persistence of jaundice, I feared that the case would turn out to be one of malignant disease, but seeing that his ease had been diagnosed as gall-stone obstruction by more than one able observer, I thought it might be well to recommend an exploratory incision. I therefore gave him an order for admission to the General Infirmary at Leeds.

On admission, he was very thin and intensely jaundiced ; the liver reached nearly to the umbilicus, and the gall-bladder could be felt extending for several inches below it.

On February 17th an incision one inch and a half long was made in the right linea semilunaris, immediately over the distended gall-bladder, which was emptied of thirty ounces of clear fluid by aspiration. The finger was passed along the outside of the gall-bladder and cystic and common ducts, which were found to be free of gall-stones. A hard tumour about the size of an orange was felt in the region of the head of the pancreas. As this could not be removed, the

wound was closed. The patient made an uninterrupted recovery, and returned home within the fortnight.

CASE 30. *Cholecystotomy ; cholelithotripsy.*—On March 29th, 1890, I received a letter from Dr. Gerald Coleman to say that Mrs. F. was suffering from frequent attacks of cholelithiasis, such as had been described in her former illness (CASE 14). At the time of the previous operation, although I removed all the gall-stones I could feel, I had the impression that the termination of the cystic duct had not been thoroughly cleared. I was therefore not very much surprised to receive this information, although on December 23rd, 1889, I had a letter from Mrs. F. to say that she was feeling very well.

The further history of the case is in Mrs. F.'s own words. "I kept well until Christmas Day, when a gathering formed in my side, which I poulticed ; but I had no return of the pain with it. The next attack was on January 8th, when the temperature was above normal for about a week, and a gathering formed on my right side, from which a large quantity of clear matter escaped." After this the painful attacks were more frequent, and were accompanied by shivering, etc., like ague. These attacks continued

more or less frequently until February, 1891, when, after consultation with Dr. Coleman, a further operation was decided on. For some weeks before operation Mrs. F. had been persistently, though not intensely jaundiced, and had lost weight considerably.

On February 26th the abdomen was opened in the old cicatrix, when the gall-bladder was found to be slightly distended, and after aspiration, was opened, but both it and the cystic duct were found to be free of calculi. The common duct, however, contained several concretions, some of which were crushed between the finger and thumb, others between padded forceps, the fragments being passed on into the duodenum.

The gall-bladder was drained for a few days and recovery was uninterrupted. In August I received a letter from Mr. Gerald Coleman to say that Mrs. F. is now quite well, and is entirely free from pain. I had also a letter from Mrs. F. to say that she had never been in better health.

CASE 31. *Cholecystotomy; cholelithotomy; jaundice.*—James I., æt. forty-five, a patient of Mr. Drake's, was admitted on March 3rd, 1891, deeply jaundiced.

He gave the following history:—He was quite well up to seven months previous to

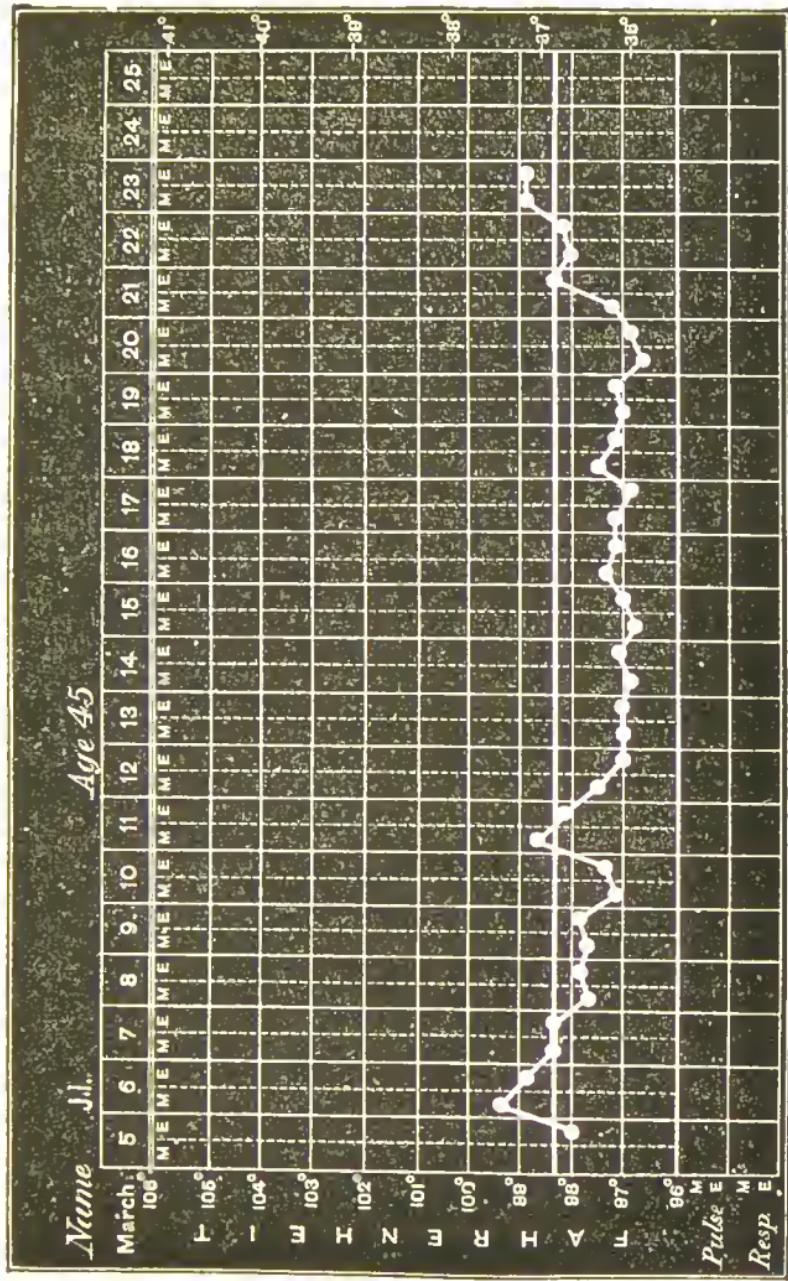


Fig 17.—Temperature Chart of Case 31.

admission, when he began to suffer from a feeling of weight and uneasiness about the upper part of the abdomen, especially on the right side, hardly amounting to pain, but still sufficiently severe to distress him. This would last for a day or two, and then pass away, and not recur for five or six weeks. There was no jaundice, no sudden onset of acute pain, and no vomiting. At the end of six months he was suddenly seized with an attack of acute pain in the right hypochondrium, accompanied by a marked and prolonged rigor. The pain lasted for twelve hours. There was no vomiting. Two days later he became jaundiced. The jaundice gradually increased in intensity, and persisted up to the time of admission. He had a second attack of pain, accompanied by vomiting, fourteen days after the first. On admission, the following conditions were noticed :—

Body thin and wasted. Pulse rather feeble. Deep jaundice. Bowels regular, the faeces being very pale. Urine acid, no albumen, sp. gr. 1022. Abundance of bile pigment. Area of liver dulness not enlarged, but at the tip of the tenth costal cartilage, and extending downwards for two inches, could be felt a globular tense swelling : apparently the gall-bladder much distended.

On March 5th, under ether, the abdomen was opened by a two-inch incision directly over the swelling, which proved to be the gall-bladder. An aspirating needle was introduced, and ten ounces of turbid mucilaginous fluid drawn off. A small gall-stone was felt in the common duct, which was easily crushed between the finger and thumb. The gall-bladder was then opened, after packing round with sponges, and a probe passed along the duct, to make sure of its being patent. The bladder was then stitched into the incision and drained.

After the operation the temperature never rose above 99·4°. Bile discharged freely from the wound, and the patient seemed very comfortable and without pain. On March 12th he had diarrhoea, which was rather troublesome for two days. The jaundice had then diminished a little in intensity. The appetite was poor, and the patient seemed feeble, and on the whole to be rather losing ground than gaining, but without any symptoms.

The temperature remained constantly at or below the normal line; the pulse was feeble and soft. On March 18th he again had diarrhoea. He was then gradually wasting, languid, and feeble, complaining of nothing except a little

colicky pain in the abdomen. On the 22nd he was much in the same condition. The abdomen was quite free from tenderness, and flaccid. No signs in the chest of phthisis; no cough. On the morning of the 23rd, without anything to account for it, the abdomen became distended, and the pulse small and thready. There was tenderness over the abdomen for the first time. He rapidly became worse, and died collapsed about midnight. See temperature chart (Fig. 17).

At the autopsy acute recent peritonitis was found, the viscera being coated with semi-purulent lymph, a few ounces of semi-purulent fluid being found in the peritoneum. The wound was healed, and presented nothing abnormal. No perforation of the biliary ducts could be discovered, although a careful search was made, as this was the suspected cause of death. I suspect the bowel trouble was the cause of death, and that some small perforation must have escaped the notice of the post-mortem clerk who, in the absence of the pathologist, made the autopsy.

CASE 32. *Cholecystotomy and cholelithotomy.*—Mrs. B. S., æt. forty, sent to me by Mr. Oglesby, of York, was admitted on March 2nd, slightly jaundiced. She gave the following history:—

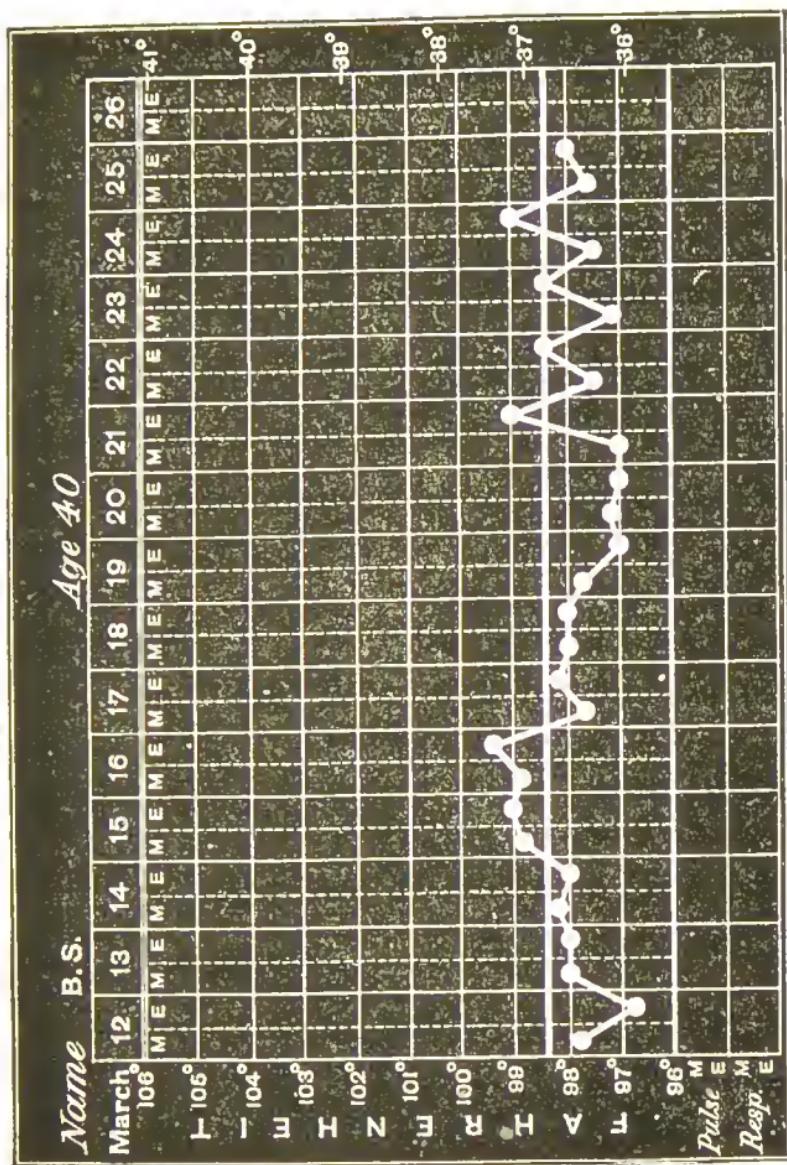


Fig. 18.—Temperature Chart of Case 32.

For three years she had suffered from attacks of acute pain in the right side of the abdomen,

starting in the right side of the hypochondrium, and radiating downwards towards the umbilicus and upwards to the back of the right shoulder. During the attacks she used to lie doubled up in bed, prostrated, sweating profusely, and vomiting. The attacks lasted as a rule from three to eight hours. Fifteen months previous to admission she had a very prolonged and severe attack, after which eleven gall-stones were found in the faeces. Up to this time she had not noticed any jaundice, but on this occasion slight jaundice followed. From this time also the attacks became much more frequent, occurring once, twice, and even three times a week, a slight degree of jaundice persisting. For the last twelve months she had been almost constantly in bed, barely recovering from one attack before she was seized with another. She had been taking large doses of morphia hypodermically. The last attack occurred five days previous to admission.

On admission her condition was as follows :—

Slight jaundice present. Face thin, and expression anxious. Great tenderness over the right hypochondrium, but no perceptible tumour; area of liver dulness normal. Before she had been in the hospital two hours she was seized

with intense biliary colic, becoming utterly prostrated, vomiting and sweating profusely.

Hypodermic injection of morphia (gr. $\frac{1}{4}$) given without any relief. At the end of half an hour $\frac{1}{2}$ gr. was given. This gave partial relief. The attack passed off in five hours. Next morning she was a little more jaundiced than when admitted. After this she had similar attacks every day for six days in succession, when she remained for three days without any seizure, but had great tenderness and constant gnawing pain in the right hypochondrium. On March 12th, 1891, the abdomen was opened. Deep under the edge of the liver the gall-bladder was found small and shrunken, with a quantity of small caleuli inside. The fundus of the bladder was three inches from the surface, and surrounded by adhesions in such a way as to make it impossible to bring it up into the wound. Flat sponges were therefore packed all round it, and the peritoncum carefully shut off. The fundus was then incised, and about five-and-twenty small gall-stones extracted. Two stones could be felt far down in the common duct. These defied all attempts at reaching and dislodging them. After enlarging the parietal incision to nearly four inches in length, they were eventually

grasped, and crushed *in situ* between the finger and thumb. The gall-bladder was then drained through the incision by means of a tube.

She had an acute attack of pain four hours after the operation, but was relieved by morphia.

March 13th.—Had another attack this morning. Large quantities of bile flowing from the wound. Dressings changed twice a day.

March 18th.—Had attacks of pain every day since the operation up to to-day. Temperature running an almost normal course. No pain to-day.

On March 20th an enema was given. The faeces were sifted through muslin, and eight or ten fragments of gall-stones found.

On March 21st stitches were taken out, the tube removed, and the wound strapped up.

On March 27th she was compelled to go home for domestic reasons. Very little bile was coming from the wound. She had no pain and seemed very well.

She was seen as out-patient in the beginning of May. She was then perfectly well. Had never had an attack of pain since leaving the hospital. The wound was absolutely healed, and she described herself as completely cured. She had

taken no morphia, and had gained half-a-stone in weight. See temperature chart (Fig. 18).

CASE 33. *Cholecystotomy for gall-stones.*—Miss H., æt. thirty-two, residing in Leeds, a patient of Dr. Braithwaite's, by whom I was asked to see the patient, had suffered for nine years from so-called "spasms." On two occasions she had had slight jaundice, but as a rule, the attacks, after lasting for a few hours, had passed off with severe vomiting and prostration. Occasionally she had had intervals between the seizures of two or three months, but of late the attacks had become more frequent, at times amounting to two in one week, and during the week previous to my seeing her they had been almost constant, morphia being required to give relief.

When I saw her on March 12th, 1891, there was an entire absence of abnormal physical signs in the region of the gall-bladder or liver, although tenderness was marked on pressure beneath the right costal margin. The patient, except for her attacks, was otherwise well.

The diagnosis of gall-stones was confirmed, and cholecystotomy was recommended.

The operation was performed on March 23rd, Mr. Croft assisting and Dr. Braithwaite being

present. Many adhesions were found: in fact, it was with some difficulty that the contracted gall-bladder was discovered under cover of the liver and colon, which were adherent. The gall-bladder was opened, and one faceted gall-stone removed. Some firm adhesions between the ducts and duodenum suggested the possibility of ulceration having occurred between the two, but as the cystic and common ducts felt to be clear, no further adhesions were separated. With some difficulty the cut edges of the gall-bladder were sutured to the parietal peritoneum, and a drainage-tube was left in, the remainder of the wound being closed.

Bile soon commenced to flow, and the drainage-tube was removed on the fourth day, the patient making an uninterrupted recovery.

When heard of a few months after, she was quite well, and had had no further attacks.

CASE 34. *Cholelithotomy*.—Mrs. E. R., æt. forty, admitted to the infirmary March 25th, 1891 (Fig. 19).

Four years previously she was suddenly seized with a stabbing pain in the right side, localised to the lower border of the ribs. It came on in paroxysms, lasting for an hour or two. This was repeated from time to time for four months,

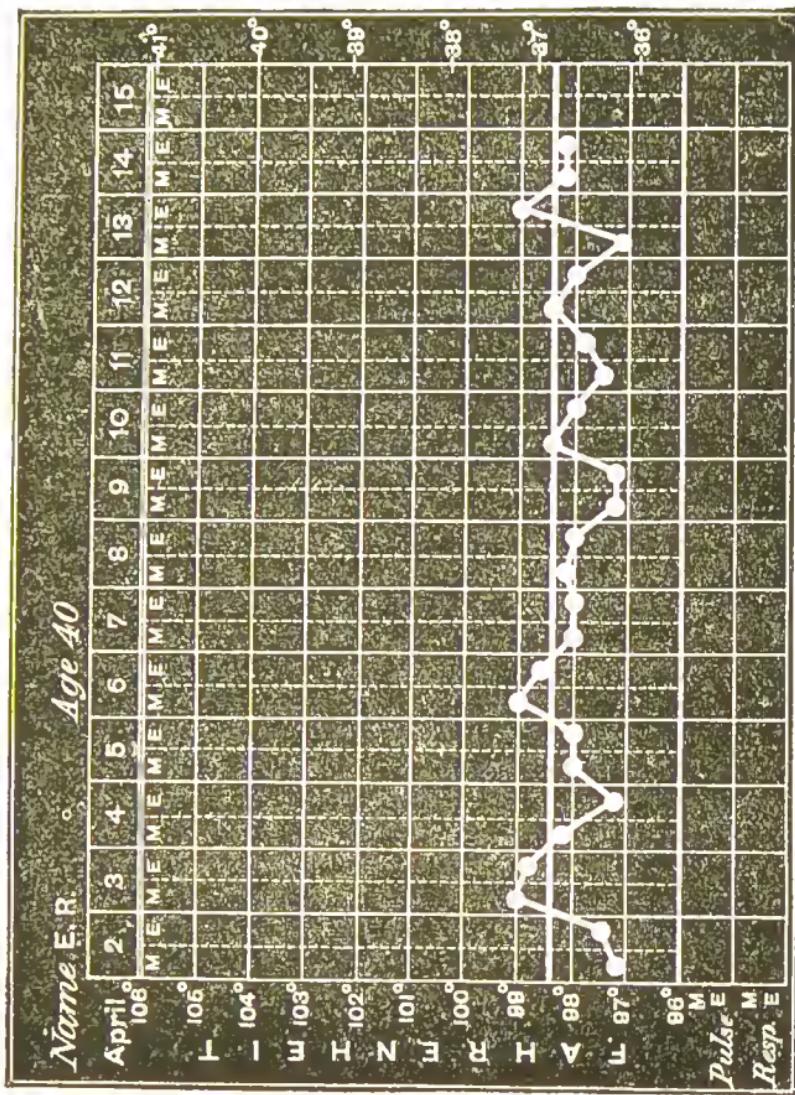


Fig. 19.—Temperature Chart of Case 34.

when the attacks gradually became less frequent, and eventually ceased.

During the four months she was almost continually jaundiced, but not to any great degree.

She continued well after this illness up to two years previous to admission, when she began with precisely similar symptoms. She remained in this condition up to the time of admission. She had never found any gall-stones in the faeces.

On admission, her condition was as follows:—Complexion clear and rosy, but conjunctivæ have a slightly yellow tinge and the vessels are injected. Liver dulness commences at the upper border of the seventh rib, but the chest generally seems hyper-resonant, and the liver dulness has not so dull a tone as generally found. The edge of the liver cannot be felt below the costal cartilages. There is no tenderness over the region of the gall-bladder. Faeces rather light-coloured. Urine, sp. gr. 1020, acid, no albumen; no bile pigment.

On April 2nd, under ether, the abdomen was opened by an incision two and a half inches long, commencing at the tip of the tenth costal cartilage. On exploring, it was found that the liver was abnormally small, and that the right and left lobes were almost completely separated by the longitudinal fissure, which was greatly exaggerated, running backward for a much greater distance than usual. Moreover, the liver

seemed to be rotated to the right, in such a way that the gall-bladder lay in the anterior axillary line, quite under cover of the ribs. At the neck of the gall-bladder a gall-stone could be felt about the size of a filbert. As it was impossible to see the gall-bladder to open it, an attempt was made to crush the stone by means of the fingers. This failed, and forceps covered with indiarubber were tried, but could not be applied successfully, on account of the position in which the gall-bladder was placed. A second attempt was then made with the fingers, the hand being introduced into the abdomen, and this time with success, as the stone flattened out, and was eventually reduced to fragments. The abdomen was then closed and the incision dressed antiseptically.

The patient never had a bad symptom; the temperature never reached 100°; she had no pain, and seemed perfectly well. On April 11th the bowels were opened by enema, and several fragments of gall-stones were found in the faeces. The wound healed by first intention. She went home on April 20th, and was last seen in July, when she was perfectly well.

CASE 35. *Cholelithotomy*.—E. S., æt. fifty, was admitted on May 2nd, 1891 (Fig. 20).

Name ELIZABETH S.

Age 50

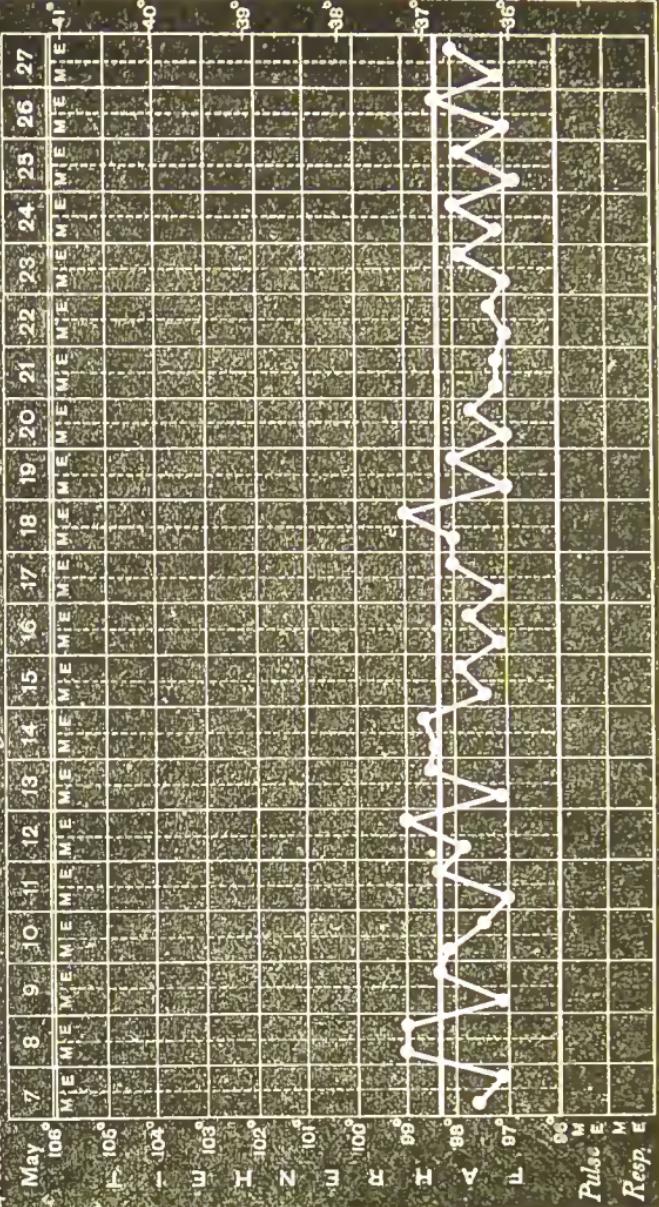


Fig. 20.—Temperature Chart of Case 35.

For five years she had suffered from attacks of acute pain in the right hypochondrium, shooting up to the right shoulder-blade, and followed by transient jaundice, with dark-coloured urine and clay stools.

During the attacks there was always vomiting and profuse sweating, and their duration varied from three to seventeen hours. The interval between each attack was usually two or three months at first, but for twelve months prior to admission the seizures had recurred every fortnight or three weeks. She had never found any gall-stones in the motions, although she had frequently looked for them.

On May 7th, under A.C.E. anaesthetic, the abdomen was opened by a vertical incision at the tip of the tenth right costal cartilage. The gall-bladder was found under the edge of the liver, but it was too small and contracted to bring to the surface. There were many adhesions to surrounding parts. Three gall-stones could be felt in the bladder, one of which was crushed easily between the fingers; the other two were too hard to yield to digital pressure, but were eventually crushed by using forceps with the blades covered with rubber. The abdominal cavity was then sponged out and closed.

The same evening the patient had a sharp attack of biliary colic. A small hypodermic injection was given, which relieved the pain, and from this time she had not a single bad symptom. On May 15th the wound was dressed and found to be perfectly healed, and the stitches were removed. On the 16th the bowels were moved, and fragments of gall-stones were found in the faeces. She left the hospital on June 3rd, and when last seen, in July, she was quite well.

CASE 36. *Choleystenterostomy for biliary fistula*.—Mrs. V. B., aged forty-four, who had choleystotomy performed on January 14, 1888 (*see* page 173), made an uninterrupted recovery, with the exception of having a biliary fistula, through which apparently the whole of the bile was discharged; for both the faeces and the urine showed no trace of biliary matter, either by inspection or on chemical examination.

During the fifteen months subsequent to the operation the patient's digestion was unimpaired, unless she took too much fatty matter, and then she became sickly and lost her appetite, and rather more fat than normal was passed in the motions; the bowels were quite regular without the use of aperients, and the odour was in no wise different from that of healthy faeces.

Now, although the patient was in good health, her condition was a very miserable one, since no apparatus could be made to fit sufficiently close to catch the whole of the bile, except when she was in bed. When out of bed she had to catch the overflowing bile in absorbent cotton, which was retained in position by means of a bandage, thus necessitating her frequently changing her dressings and clothes. On one occasion, when she was unable to change the wool, the wearing of her bile-saturated garments gave her a severe chill, which resulted in an attack of pelvic cellulitis.

She was so miserable at the prospect of having to go through life with her fistula, that when I mentioned to her the possibility of again turning the bile into the bowel, she said she would risk anything to be rid of her trouble.

I asked my colleagues to see her with me, and they agreed that choleceystenterostomy was perfectly justifiable if its risks were fully explained to the patient.

Her consent was at once granted, and on March 2nd, 1889, I opened the abdomen in the right linea semilunaris through the old scar, in the centre of which was the fistula, prolonging

the opening two inches beyond the lower end of the cicatrix. The gall-bladder was detached from the parietes, and found to be much contracted and thickened. There was so much matting of the viscera that it was found impracticable to bring up and fix the duodenum or jejunum to the gall-bladder, as at first intended; hence the hepatic flexure of the colon, lying near, was raised and encircled by an elastic ligature, after its contents had been squeezed upwards and downwards. Convenient spots having been selected on the gall-bladder and colon, a circle the size of a florin was marked by a scalpel on each viscus. Along these lines, sutures of fine chromicised catgut were passed, about an eighth of an inch apart, by means of curved sewing-needles, but these were not tightened until openings a third of an inch in diameter had been made in the centre of the circles, quite through all the coats of the two viscera concerned, and the cut edges of the mucous membrane of the colon had been sutured by a number of interrupted stitches of fine catgut to the edge of the mucous membrane of the gall-bladder. The closed blades of a pair of Spencer Wells's pressure forceps were passed through the opening from the gall-bladder into

the bowel, in order to see that it was thoroughly patent after the ligatures had been tightened. The outer row of ligatures, only involving the serous and muscular coats, were tied and cut off short.

The refreshed edges of the old fistula were then brought together by means of a continuous catgut suture, the serous surface being tucked in, and a number of Lembert's sutures being further applied over the line of union.

The elastic ligature was removed from the bowel, and the circulation became immediately re-established. The sponges which had been packed below and around the colon and gall-bladder had prevented soiling of the peritoneum.

A glass drainage-tube was placed in the right kidney pouch, and brought out at the lower end of the wound, in order to guard against any accident of sutures giving way.

Lastly, silk sutures were employed to bring together the parietal incision in the usual manner. The patient had a little pain, but no sickness or distension.

On the night of March 3rd a tinge of bile appeared on the dressings, showing that the over-tense sutures on the outer surface of the

gall-bladder had given way, but, thanks to the drainage-tube, without any dangerous result.

On the following day the bile came freely through the drainage-tube, and on March 5th faecal matter made its appearance, mixed with bile, after which, up to the 18th, faeces and bile continued to be discharged, and then bile alone, the wound granulating and ultimately completely closing on May 6th, when the motions were noticed to have fully regained their normal colour.

The patient, who was sent to a convalescent home, rapidly gained strength and weight, and reported herself in July as in perfect health. When she left the infirmary she weighed 8 st. $4\frac{1}{2}$ lbs., and in July her weight was 9 st. $6\frac{1}{2}$ lbs.

She was shown to the members of the British Medical Association in Leeds in August, and then said that she had never been in better health.

During the time the fistula was open the menstrual functions were in abeyance. After its closure the menses returned, and have continued to recur regularly.

While the bile was being discharged externally, Mrs. B. had a dislike to fat, to meat,

and to sweet food, and a craving for acids, such as lemons and pickles.

The fact of the patient having within the space of four years undergone three abdominal sections is worthy of note. Her first operation, the removal of a pyosalpinx, restored her to health and comfort after several years of distress and incapacity, besides relieving her from the constant danger of suppurative peritonitis. The second operation, cholecystotomy, for empyema of the gall-bladder, undertaken when she was apparently dying of peritonitis, undoubtedly saved her life. The third operation, cholezystenterostomy, performed for a condition which rendered her life wretched, restored her to a condition of absolutely perfect health, for she is now strong, well, and healthy in every respect.

The cause of the fistula was apparently a cicatricial contraction of the duet. It was, therefore, hopeless to attempt to secure a return of the bile to the intestine by the ordinary channel, and on opening the abdomen it was found impossible, on account of the old adhesions, to suture the gall-bladder to the small intestine in the region of the duodenum. It was therefore sutured to the colon. Instead of using the ordinary

intestinal clamps, or passing ligatures through the mesentery and around the bowel, a loop of colon, after its contents had been squeezed out, was simply drawn up, and secured at its base by an ordinary piece of elastic drainage-tube, which was fixed by a pair of pressure forceps. This tourniquet both prevented any escape of gas or faecal matter, and rendered the intestine almost bloodless: in fact, it simplified the operation very considerably, and was applied in a few seconds.

There is nothing calling for mention in the mode of application of the sutures, which were applied after the Czerny-Lembert method.

The loss of tissue from the outer surface of the gall-bladder, where it had been stitched to the skin for so long a period, rendered it necessary to apply more tension than was desirable in order to secure exact apposition of serous surfaces. I therefore thought it wise to insert a glass drainage-tube into the right kidney pouch, in case of the escape of any bile or faeces. This precaution prevented a catastrophe when the tense sutures gave way.

As I assumed that the escape came from the outer surface of the gall-bladder, and not from its junction with the intestine, I felt confident.

that the fistula would ultimately close by granulation, and that then the bile would be able to flow through the new channel. I am glad to say that this prognosis was justified by the course of events.*

October, 1891.—Mrs. R. is now in good health, and carrying on efficiently the duties of a monthly nurse.

CASE 37. Acute intestinal obstruction, due to volvulus set up by passage of large gall-stone; laparotomy; cure.—Mrs. H. E., aged sixty-eight, was admitted on November 12th, 1890, with acute intestinal obstruction. Dr. Hamilton, of Crowle, Lincolnshire, who brought the patient to see me, gave me the following history:—The patient had enjoyed very good health up to eight days previous to admission, when she was suddenly seized, without warning, with intense abdominal pain and vomiting. For three days the vomiting was incessant, and on the fourth became stercoaceous. Enemas and medical treatment were tried without success. On the eighth day she was brought by train and ambulance to the infirmary. The bowels had not been

* For report of the discussion on this paper, see *Proceedings of Royal Medical and Chirurgical Society*, Third Series, vol. ii. p. 28.

relieved from the first, although a little flatus was passed up to the date of admission. When admitted, the abdomen was much distended and hyper-resonant on percussion. Pulse, 110; temperature, 99°. She was fully under the influence of opium. Nothing abnormal per vaginam or per rectum to be felt. At the end of twelve hours she had vomited twice. Vomit, stercoraceous. Pulse, 130; temperature, half a degree lower than before. A distended coil of bowel could be felt near the umbilicus, and from this point the coils of intestines could be seen to move. The A.C.E. mixture having been administered, the abdomen was opened in the middle line. The small intestine was much distended, the large intestine collapsed. A congested loop of the ileum was then found, with a marked constriction at the ends. On rotating this on its mesenteric axis, it gave a sudden twist, and gas and fluid contents were felt rushing through it. On examining the coil there was found a deep furrow across it, surrounded by recent inflammatory lymph.

The abdomen was closed, and as the loop was deeply congested, it was stitched in the wound, but not opened. The patient made a good recovery. The second day faeces passed from the

wound on account of a stitch-hole giving way. On the third and fourth days copious motions were passed per rectum, and she was practically convalescent at the end of a week, when a gall-stone, the size of a large walnut, passed per anum. This had probably been the exciting cause of the volvulus. The minute faecal fistula soon closed, and when I heard of the patient two months afterwards, she was in good health.

CASE 38. *Tumour of gall-bladder and movable right kidney; abdominal section.*—Mrs. M., aet. 59, a patient of Dr Dobie's, consulted me in September, 1891, on account of a tumour under the right costal margin, which was the seat of pain and discomfort. Her general health had failed during the past few months, and she had lost flesh. As several of her relations had died from cancer, she feared lest she might be the subject of malignant disease.

The tumour, about the size of a goose's egg, presented all the signs of enlarged gall-bladder, and beneath it could be felt another freely movable swelling, which was diagnosed as a movable kidney. In November the swelling had increased, and the other symptoms had not lessened; hence it was decided that an operation should be done. On December 5th, 1891, the

abdomen was opened, and the tumour was found to be an enlarged gall-bladder, together with a movable right kidney.

The gall-bladder was emptied of several ounces of deeply bile-stained fluid, but no gall-stones were found. The opening in the gall-bladder was sutured, and the parietal incision closed. Recovery uninterrupted. Two months afterwards the patient was in good health, and had had no return of pain. A pad over the right side of the abdomen gave support to the movable kidney.

CASE 39. *Malignant tumour of omentum, simulating enlargement of gall-bladder, and preceded by pains like cholelithiasis.*—Mrs. J. R., æt. 51, was sent to me on January 12th, 1892, by Dr. Gordon Black, of Harrogate, for exploration of a tumour thought to be malignant, but which it was hoped might be a distended gall-bladder. She first noticed pain in the upper part of the right side of the abdomen eighteen months before; the pain occurred in paroxysms lasting from three to fifteen hours, the seizures being accompanied by sickness and vomiting, and at times followed by jaundice. The intervals between the attacks varied, but seldom exceeded a fortnight. A year before, the pain changed,

becoming more or less constant, with irregular exacerbations; and instead of being in the region of the liver, its chief seat was at the epigastrium.

About three months previous to admission a tumour began to be felt to the right of the umbilicus, and from this time there was occasional trouble with the bowels, almost amounting to obstruction, but relieved by large enemata. She had lately rapidly lost flesh and strength.

On admission, a hard nodulated mass could be felt passing under cover of the liver and reaching to the left of the umbilicus. There was an absence of tenderness and of resonance on percussion. The tumour was movable to a certain extent from side to side, and moved up and down during respiration. There was no jaundice.

On January 14th a small exploratory incision was made over the gall-bladder, which was found to be healthy and its ducts clear. The tumour appeared to be of a malignant nature, growing in the omentum, and probably fixed to the transverse colon. It was not interfered with. Recovery was uninterrupted, and she returned to Harrogate on February 2nd, looking better than when she came. Curiously, the pain almost

disappeared for a fortnight after the operation, and she took her food decidedly better. I have little doubt that Mrs. R. had suffered from cholelithiasis to begin with, and that the tumour developed subsequently.

CASE 40. *Tumour of gall-bladder; Cholecystotomy; removal of 23 gall-stones.*--Mrs. C., wt. 44, was sent to me by Dr. Stewart, of Batley, on account of severe pain on the right side of the abdomen. She had been subject to "spasms" and "biliary attacks" for several years. A year ago, during an attack of vomiting, she was seized with a violent pain under the right ribs, and from that time the spasms ceased, but a swelling soon began to be noticed, and she thought it had gradually increased.

She had never been jaundiced.

She was unable to perform her household duties, as any exertion at once brought on an aching and pain in her side.

On admission to the Infirmary in February, 1892, the swelling of the gall-bladder was about the size of a large pear.

Cholecystotomy was performed, 4 ounces of clear fluid being removed from the gall-bladder, together with 8 gall-stones, dark in colour, much faceted, and very hard. The remaining 15

were removed from the cystic duct by means of forceps within, aided by the fingers outside the duct. The largest gall-stone was much lighter in colour, and as large as a small walnut. It was the farthest down the duct, and was with difficulty removed.

The cut edge of the gall-bladder was sutured to the aponeurosis, and a drainage-tube left in the gall bladder, from which bile at once began to flow. The tube was removed on the third day, and the parietal sutures on the eighth.

Recovery uninterrupted.

CASE 41. *Cholelithiasis, jaundice, cholecystotomy, and cholelithotripsy.*—Mr. J. O., æt. 51, was sent to me by Dr. McGregor, of Huddersfield, on account of deep jaundice, thought to be due to obstruction by gall-stones. He was admitted to the Infirmary February 8th, 1892, and gave the history that he had had his first seizure four years ago, and was ill for two days. After numerous attacks, he had a very serious one fourteen months ago, when he was ill and deeply jaundiced for several weeks. His present attack began nine weeks ago, and during this time he had had numerous ague-like seizures, the jaundice being always worse after these paroxysms.

Beyond the jaundice no abnormal physical

signs could be made out. In deference to a medical opinion, olive oil was given for three weeks, without the slightest amelioration of the symptoms in any way.

On March 3rd cholecystotomy was performed, the gall-bladder being thick, small, and shrunken, and the ducts thick and full of concretions ; both bladder and ducts being completely enveloped by adhesions of omentum and other viscera. After the adhesions had been separated the gall-bladder was incised, the walls being thickened and the cavity reduced to a mere tube, through which a few fragments of gall-stones were removed, those in the ducts being crushed by the finger and thumb and by padded forceps. A drainage-tube was inserted, and the opening in the gall-bladder was sutured to the parietal peritoneum and aponeurosis, the rest of the wound being closed in the usual way. An attack of bronchitis slightly retarded recovery, which otherwise was uninterrupted. The jaundice entirely disappeared within a fortnight and bile passed in the motions within a week.

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